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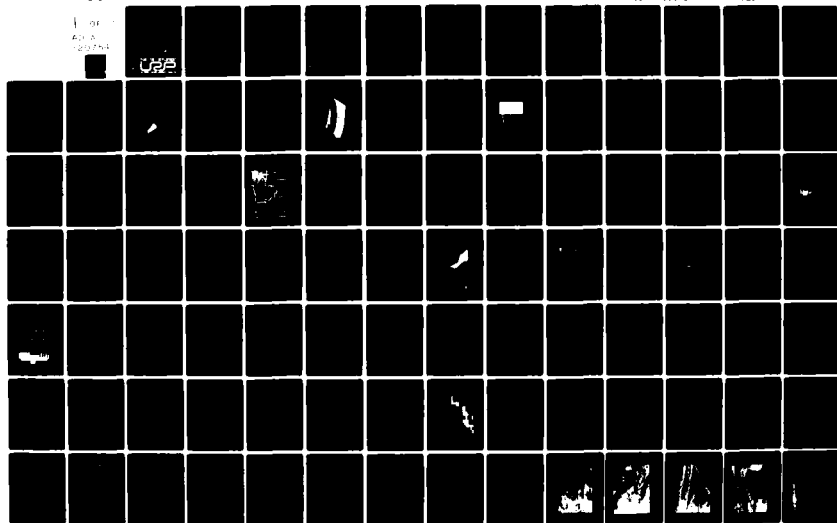
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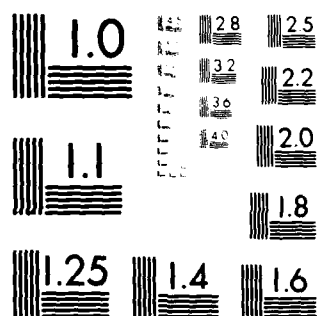
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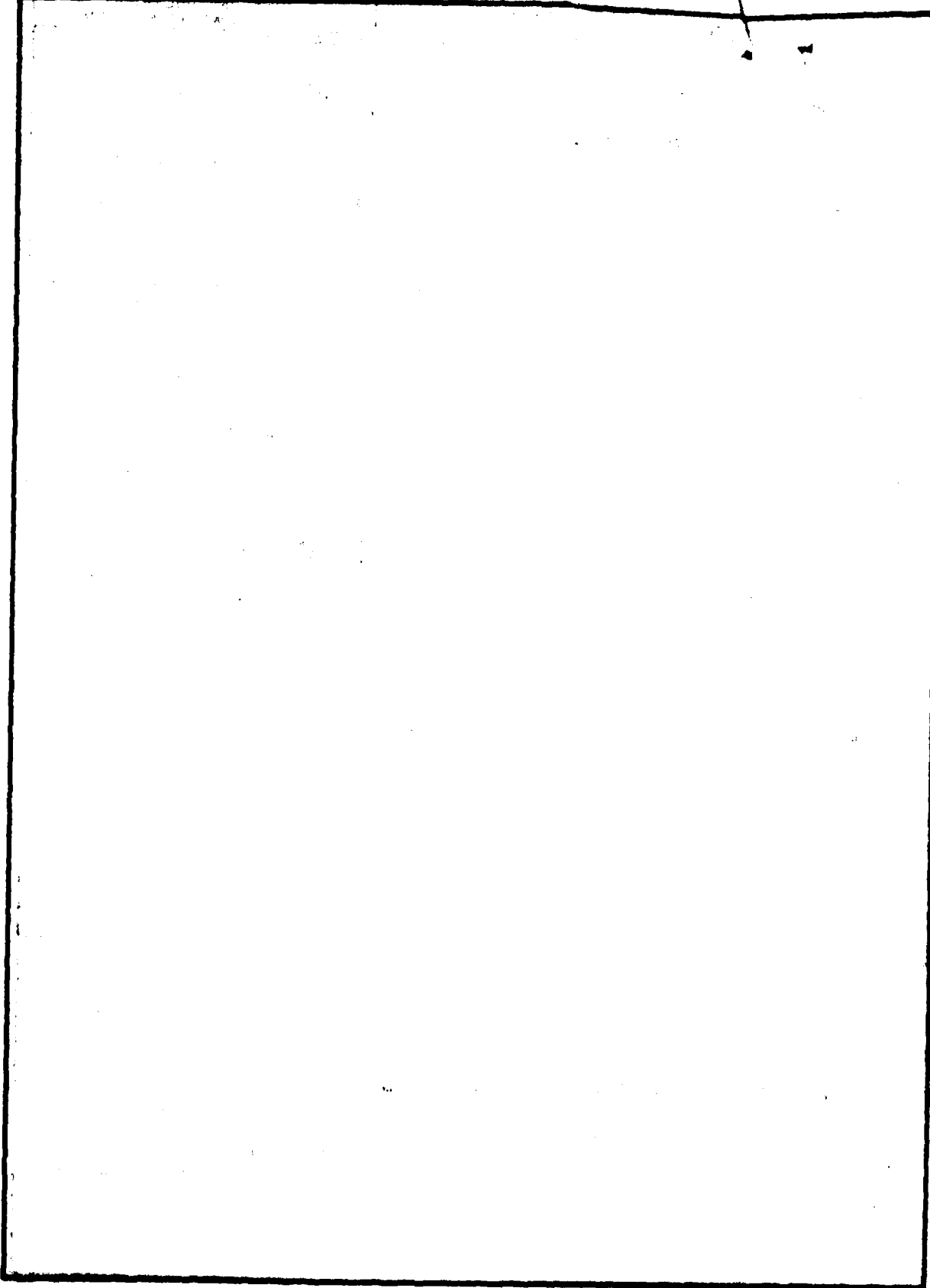
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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report details the development plan for Lake Rebecca and examines project alternatives. Project features include constructing a lake outlet control structure, raising the lake level, constructing a dike, relocating a 4,000- stretch of powerline, installing aerating equipment, and developing recreation facilities at the lake. | | |

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**SUPPLEMENT NUMBER 1
MISSISSIPPI RIVER
9-FOOT CHANNEL NAVIGATION POOLS
ST. ANTHONY FALLS POOLS AND POOLS 1-10
MASTER RECREATION PLAN**

**PLAN FOR DEVELOPMENT
LAKE REBECCA - POOL 2
HASTINGS, MINNESOTA**

SELECTED
OCT 26 1982

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**U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
1135 U.S. POST OFFICE AND
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ST. PAUL, MINNESOTA 55101**

MARCH 1978

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PREFACE

This report and the accompanying environmental impact statement for the Lake Rebecca project represent the final steps in the planning process prior to the development of construction plans and specifications. This planning effort has been accomplished jointly by the St. Paul District and the Lake Rebecca Task Force, representing the city of Hastings, Minnesota, with numerous inputs from various Federal and State agencies.

Those responsible for the preparation of this report represent an interdisciplinary team whose efforts have resulted in an environmentally acceptable, engineeringly feasible, and economically justified course of action.

Special acknowledgements must be given to the Minnesota Department of Natural Resources and the Minnesota Pollution Control Agency for their efforts in the development of the recommended plan.



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PLAN FOR DEVELOPMENT
LAKE REBECCA PARK
HASTINGS, MINNESOTA

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SUMMARIZED PROJECT DATA

Existing Conditions

| | |
|-------------------------------|-----------------------|
| Surface Area of Lake Rebecca | 41 Acres |
| Lake Level of Lake Rebecca | 677.5 |
| Average Depth of Lake Rebecca | 5.75 |
| Maximum Depth | Approximately 10 feet |
| Federally Owned Land | 130 Acres |

Plan for Development

| | |
|--|---------------------------------------|
| Proposed Elevation of Lake Rebecca | 680 |
| Proposed Surface Area of Lake Rebecca | 72 Acres |
| Increase in Surface Area of Lake Rebecca | 31 Acres |
| Maximum Depth | Approximately 14 Feet |
| Increase in Wetlands Area | 13 Acres |
| Loss of Terrestrial Habitat | 27 Acres |
| Lands to be Leased to the City | Approximately 126 Acres |
| Lands to be Acquired in Flowage Easement | 23 Acres |
| Lands to be Affected by Scenic Zoning | 40 Acres |
| Proposed Fishery | Northern Pike/Largemouth Bass/Sunfish |

Recreation Facilities

| | |
|-------------------------------|---|
| Picnic Tables | 35 |
| Water Surface Area | Approximately 50 Acres |
| Canoe/Boat Launch | N/A |
| Hiking Trails | 4,500 Feet |
| Nature Trails | 3,000 Feet |
| Sand Beach | 30,000 Square Feet (50 Feet x 600 Feet) |
| Swimming Area | 60,000 Square Feet (100 Feet x 600 Feet) |
| Changehouse/Restroom Building | 36 Feet x 36 Feet |
| Estimated Annual Visitation | 90,200 |

Costs

| | |
|---------------------------------------|-----------|
| Total Project Cost | \$908,700 |
| Non-Federal Share | 350,900 |
| Federal Share | 557,800 |
| Annual Operation and Maintenance Cost | 21,110 |
| Benefit/Cost Ratio | 1.77:1.00 |
| Cost of Recreation Development | 445,500 |
| Cost of Fish and Wildlife Enhancement | 446,700 |

1.00 INTRODUCTION

1.01 Project Authorization - The enhancement of fish and wildlife values and development of public use (recreation) facilities at Lake Rebecca are authorized by Section 4 of the Flood Control Act of 1944 as amended, and by Section 2 of the Fish and Wildlife Coordination Act of 1958 (Public Law 85-624).

1.02 Purpose of Study - The purpose of this study is to determine the best way to enhance fish and wildlife values and to develop public use (recreation) facilities at Lake Rebecca.

1.03 Scope of Report - This report presents information concerning existing conditions on and related to the site, and a plan of development based upon the needs of the community, the capability of the resource, and the willingness of the local sponsor to participate. Implementation and management guidelines are also included.

1.04 Local Participation - The development of this project has the ongoing support of the city of Hastings, the Lake Rebecca Task Force, the Hastings Chamber of Commerce, and the citizens of Hastings. This support has evolved through the continued participation in the planning process by local citizens and the Corps of Engineers.

1.05 History of Involvement - Prior to 1928 Lake Rebecca was a semi-isolated back channel of the Mississippi River about 1.8 miles long and 350 feet wide lying parallel to and approximately 2,600 feet west of the main channel of the Mississippi River. The lake at that time had an inlet and outlet stream. At one time in geologic history this back channel may have been part of the main channel of the Mississippi River. In 1928, the Corps constructed Lock and Dam No. 2 (L/D 2) at Hastings as part of the 9-foot channel navigation project. A dike was constructed across the back channel and the upper portion was inundated by Pool 2 of the Mississippi River. The lower portion became the present-day, 41 acre Lake Rebecca.

1.06 Beginning in the 1940's the conditions in Lake Rebecca began to deteriorate and local citizens periodically petitioned the Corps during the 1950's and 1960's to "restore" Lake Rebecca, as they believed Corps construction activities at L/D 2 in the mid-1940's were responsible for the deterioration of the lake.

1.07 Through the efforts of local citizens, the most recent investigation of Lake Rebecca was conducted in 1975 by the Corps of Engineers to determine the reasons for existing physical conditions and to assess the area's potential for future recreational use. The results of that investigation led to the consensus that the improvement of fish and wildlife habitat and the development of recreational facilities were feasible and could best be pursued jointly by the city of Hastings (as the local sponsor) and the Corps of Engineers (as the Federal agency) under principles of the Federal Water Project Recreation Act, which are being applied administratively to projects authorized prior to 1965.

1.08 On 15 March 1976 the city of Hastings submitted to the Corps of Engineers a letter of intent concerning local participation in recreation and fishery enhancement features at Lake Rebecca (exhibit 1). During the summer and fall of 1976 meetings were held which included local citizens and organizations, State agencies, and Federal agencies, to discuss and coordinate information necessary to formulate a feasible plan of action. In May of 1977 a public meeting was held in which two alternatives for development were presented. The comments and statements received from concerned members of the public provided input for selection of the draft plan for development. Another public hearing was held 23 August 1977 to solicit public comments on the draft plan for development. The comments from this meeting were considered in preparation of the recommended plan for development. The city of Hastings restated its intent to participate in the development of Lake Rebecca in a Resolution of the City Council passed 7 November 1977 (exhibit 2).

1.09 Project Goals - During the course of this study, careful consideration and evaluation were given to identifying overall project goals. For this project they are to establish a viable sport fishery, provide for the enhancement of wildlife, and develop public use facilities related to day-use recreation activities.

1.10 It was recognized that the following features were vital to the accomplishment of the project goals:

- a. Alleviation of the chronic winterkill problem in the lake.
- b. Control of rough fish.
- c. Provision of recreation facilities.

Later on in the planning phases, two other features were added as necessary to achieve project goals:

- a. Storm sewer diversion.
- b. Power line relocation.

1.11 In developing methods to accomplish the five tasks above, a number of features were added either as a direct result of the methods used to accomplish these tasks or as independent features added to enhance the project. These features are presented in section 4 of this document.

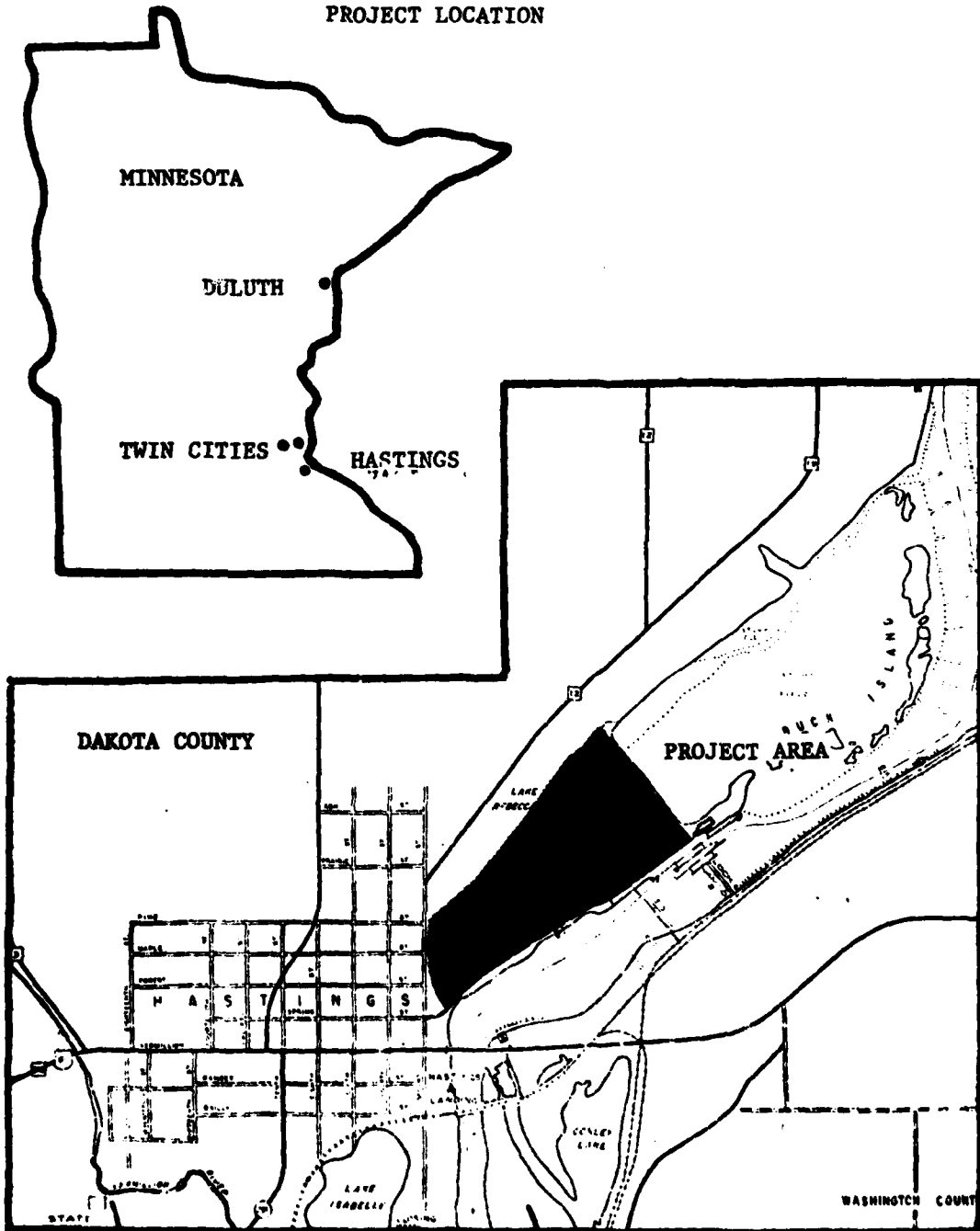
1.12 Project Location - Lake Rebecca is a backwater lake located in Hastings, Minnesota, adjacent to Lock and Dam No. 2 on the Mississippi River. The lake is approximately 1 mile in length and 300 feet wide over most of its length. Its orientation is in a northwesterly-southeasterly direction, parallel to the Mississippi River (figure 1).

1.13 Existing Development - Building foundations of a farmstead remain on the southern end of the project site. In this area there is also a dirt road to the east side of the lake, extending from the paved road that goes to Lock and Dam No. 2. The dirt road goes about half way up the lake on the east side (plate 1). An abandoned baseball field lies where the dirt access road to the lake leaves the paved road.

1.14 The Minnesota State Comprehensive Outdoor Recreation Plan (SCORP) recognizes that the region in which Hastings is located is deficient in outdoor recreation facilities. In June 1973, a Master Recreation Plan was completed for Pool 2 which included some development proposals for the Lake Rebecca area.

FIGURE 1:

PROJECT LOCATION



2.00 FACTORS INFLUENCING RESOURCE DEVELOPMENT

2.01 General - This section documents and discusses those factors which directly influence resource development. The purpose of these discussions is to focus on each factor's overall influence at Lake Rebecca. Information is presented only when important to plan formulation, site planning, or resource management - those factors which do not influence resource development (but are included in many reports as background information) are omitted for brevity.

2.02 Climate - The climate of the Lake Rebecca area is characterized by comfortable, warm summers and very cold winters. The summers, though short, are warm and humid with periods of hot days and nights. From November to March temperatures are often below freezing (32° F) and 20 to 30 inches of snow accumulate on the ground. Two-thirds of the precipitation falls with fairly regular distribution during the summer growing season. The prevailing winds are from the northwest, except during the months of June and September when they are from the southeast. The seasonal change and variation in climate provide an opportunity for swimming, fishing, picnicking and related activities in the summer and ice fishing, ice skating, and cross-country skiing in the winter.

2.03 Topography - The topography surrounding Lake Rebecca varies from low-lying wetlands to steep, wooded hillsides. The western side of Lake Rebecca is a steep hillside which rises sharply about 60 feet in elevation above the lake. Along the northeast section of the lake the topography is low in elevation and relatively flat, while the southeast section is slightly higher in elevation and gently sloping. For development of the proposed day-use recreation facilities, the area adjacent to the southeast portion of the lake offers the best location. The topography is relatively flat while it is slightly above the elevation of the lake.

2.04 Soils - The floodplain area between Lake Rebecca and the Mississippi River was originally an island. The alluvial soils which formed the island were deposited from erosion occurring along the Minnesota River and the upper Mississippi River watersheds.

2.05 The texture of the surface layers ranges from silt loam to heavy silty clay loam. The parent materials are extremely variable. In places there are lenses of sand or gravel intermingled with finer textured material. These soils are suitable for wildlife refuges and light recreational uses.

2.06 Sediment core samples were taken to determine the subsurface character of the lake basin. Silty sediments are about 15 feet deep in the southeast end and about 10 feet deep in the northwest end of the lake. Below the silty sediments lies sandy material. About 75 percent of the lake bottom is silt with the other 25 percent being sand. The silty sediments found in the lake's bottom are not suitable to build upon because of their fine texture, fluid state, and natural ability to retain water.

2.07 In the summer of 1976 chemical analysis of some core samples from the lake indicated high levels of polychlorinated biphenyls (PCB's) present (65-660 ug/kg). In October 1976 additional samples were tested and the results indicated no detectable PCB's present. In December 1976 three sediment samples were collected, using strict quality control, for the sole purpose of analyzing for PCB levels. The results were no detectable PCB's in one of the samples and 1 ug/kg and 8 ug/kg in the other two. This leads us to conclude that PCB's are present in the lake sediments but not in levels high enough to cause concern.

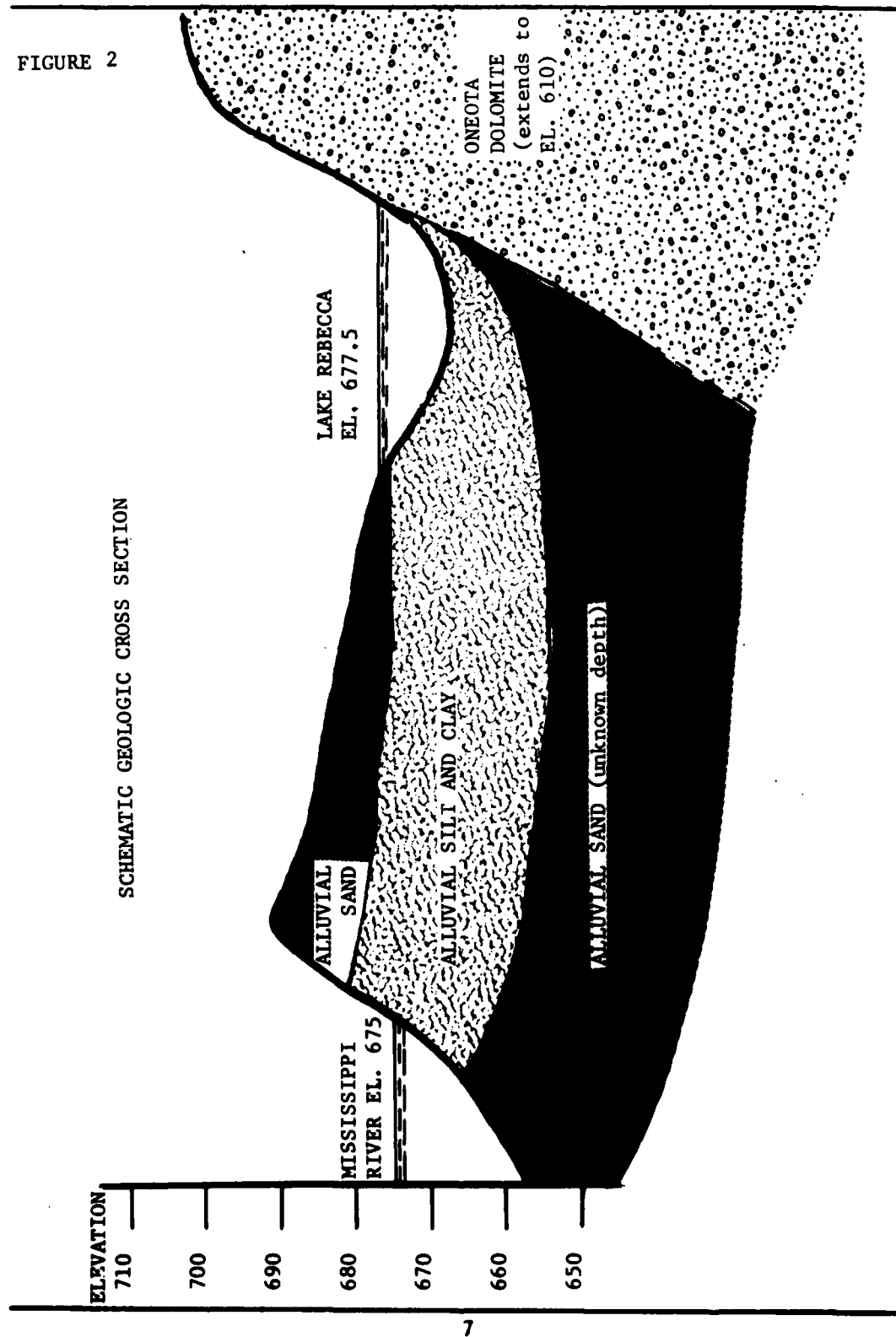
2.08 At the north end of Lake Rebecca, oil deposits remain in the sediments from an oil spill in 1970. This oil-saturated soil will be avoided for use as fill material and development will not be planned in the area.

2.09 Though there are some restrictions on development because of soils, a large portion of the soils on the site are suitable for recreation development and with appropriate analysis and design the anticipated structures can be constructed.

2.10 Hydrology - Lake Rebecca currently covers 41 acres and has a maximum depth of about 10 feet. About one-half of the lake is 5 to 10 feet deep and the other half is less than 5 feet deep. The average depth is approximately 5.75 feet.

2.11 An impervious blanket of alluvial silts and clays lies below the lake bed. It is continuous from below the lake and across the island to the river. The impervious blanket of soil thins or is absent on the westerly shore of the lake (figure 2). Below the silt and clay is a pervious layer of alluvial sands which extends to an unknown depth.

FIGURE 2



2.12 Boring records from 1927 indicate artesian water in the sands below the clay blanket in the lake. The lake is partly replenished by springs from the landward water table. General underground water movement is easterly under the lake toward the main channel of the Mississippi River.

2.13 A test raise of water surface level was accomplished in the late summer of 1976, which was a very dry year. The test results indicated that the lake can maintain a 680-foot elevation for a sustained period of time. During the test raise an estimated 2-4 cubic feet per second outflow was observed at the control structure.

2.14 Since the water level can be sustained at the 680-foot elevation, the lake's water area and volume can be increased. Most of the increase in area would be over lowlands at the northeast side of the lake, adjacent to existing marsh lands and lowlands north of the outlet channel at the south end of the project area. The largest area to be covered with water is the one along the northeast side of the lake. The increased water acreage would increase the wetland area along the northeast side of the lake.

2.15 Water Quality - Lake Rebecca is a nutrient-rich, hard-water lake. The principal sources of water are springs along the west bank, surface runoff, seepage through the dike at the north end, and urban storm water runoff. The lake level fluctuates considerably depending upon spring runoff, rains, and flood conditions of the Mississippi River.

2.16 Pollutants occasionally may enter the lake from the city storm sewer at the southwest side of the lake, but the main source is the Mississippi River, which backs water into the lake during flood stages.

2.17 The water in Lake Rebecca is highly turbid as a result of carp activity disturbing the bottom sediments. Also, wind and wave action may occasionally disturb the fine silt in the shallow areas.

2.18 Water quality samples (figure 3) taken from the lake during the summer of 1976 indicated that body contact with water would be permissible according to present Minnesota State Public Health Standards.

2.19 Over-wintering conditions in the lake become poor due to oxygen deficiencies. Oxygen content of the water was monitored during the winter of 1976-1977 to analyze current dissolved oxygen conditions (figure 4). The oxygen content was lower than that necessary for most fish to survive.

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FACTORS INFLUENCING RESOURCE DEVELOPMENT

FIGURE 3

WATER QUALITY DATA

| Parameter | # Samples or Readings | Mean | Range | Minnesota Water Quality Standards ⁶ |
|---|--------------------------|------|---------------|--|
| Secchi Disk (m) | 9 | .4 | .4-.5 | N/A |
| BOD ₅ (mg/l) | 18 | 6.8 | 4-10 | N/A |
| pH | 18 | 8.3 | 7.8-8.8 | 6.5-9.0 |
| Suspended Solids (mg/l) | 17 | 34 | 21-98 | N/A |
| Specific Conductance (umho at 25°C) | 18 | 446 | 400-500 | N/A |
| Total Alkalinity (mg/l as CaCO ₃) | 18 | 188 | 164-206 | N/A |
| Ammonia ¹ (mg/l as N) | 18 | - | <.10-.70 | 1.0 |
| Nitrates ² (mg/l as N) | 18 | .20 | <.10-.60 | N/A |
| Total Phosphorus (mg/l as P) | 18 | .26 | .13-1.5 | N/A |
| Ortho Phosphorus (mg/l as P) | 18 | .036 | <.01-.10 | N/A |
| Oil ⁴ (mg/l) | 18 | - | < 1-5 | 0.5 |
| Phenol (mg/l) | 18 | - | < 0.002-0.004 | 0.01 |
| Total Chromium (mg/l as Cr) | 18 | - | < 0.05 | 0.05 |
| Copper (mg/l as Cu) | 18 | - | < 0.05 | 0.01 |
| Fecal Coliform ⁵ (no./100 ml) | 18 | 36 | < 20-200 | 200 |

¹ 14 of 18 samples were <.10

² 5 samples with <.10 results were used as .10 in calculation of the mean

³ 4 samples with <.01 results were used as .01 in calculation of the mean

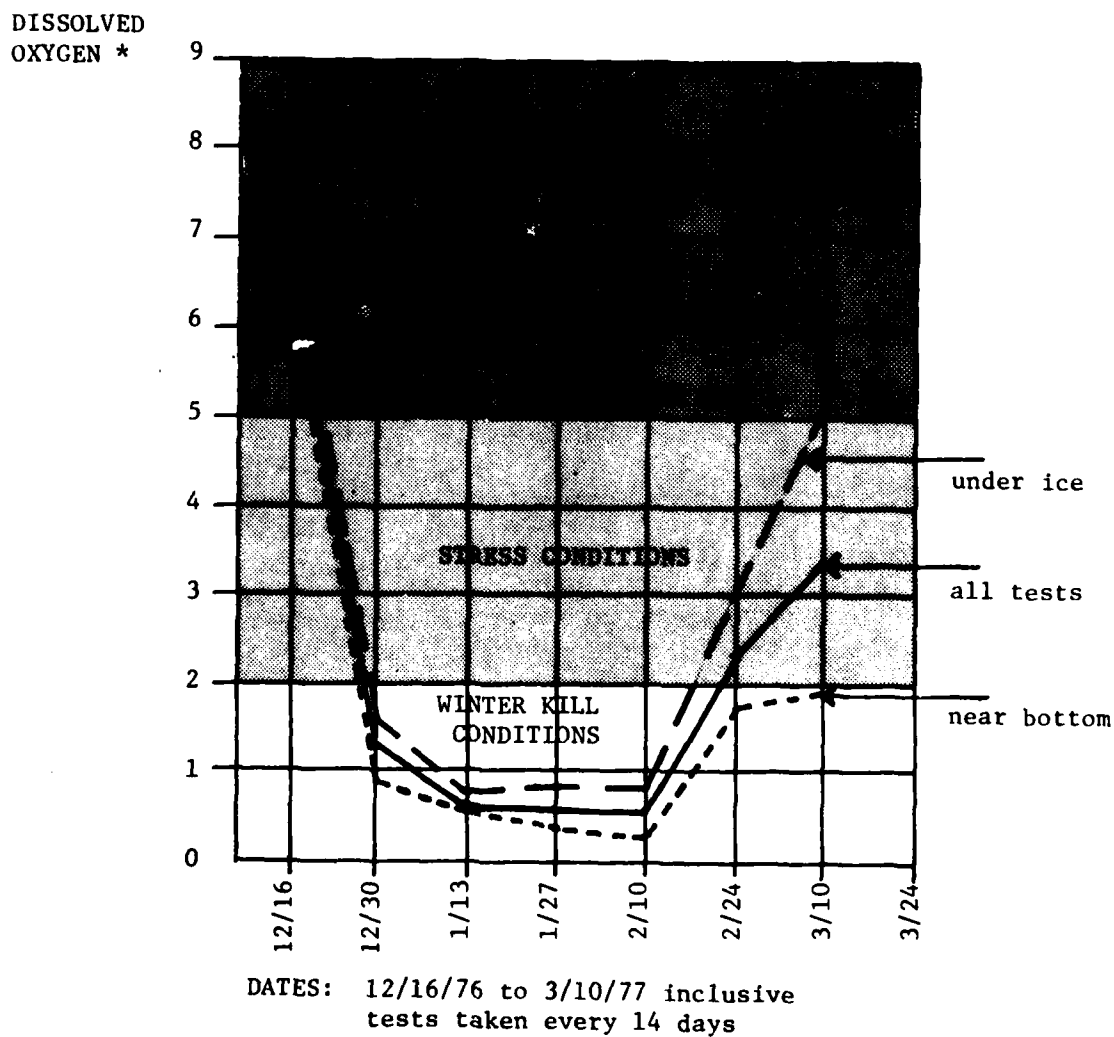
⁴ 14 of 18 samples were <1

⁵ 10 samples with <20 results were used as 20 in calculation of the mean

⁶ WPC 14

FIGURE 4

DISSOLVED OXYGEN LEVELS IN LAKE REBECCA
WINTER OF 1976-1977



* In parts per million (PPM)

2.20 Vegetation - The vegetation at Lake Rebecca is predominantly of two types: bottomland hardwood forest and wetland. The bottomland hardwood forest is a typical floodplain community with scattered large trees in the overstory, poor seedling reproduction and a sparse groundcover. The wetlands vary from water-logged soils with grasses, sedges and rushes to open water bordered by emergent vegetation (plate 1).

2.21 The overstory vegetation in the bottomland hardwood forest consists of cottonwood, green ash, silver maple, American elm, and willow, ranging in diameter from 12 to over 25 inches. The understory of silver maple, green ash and American elm is smaller, with a diameter range of 5 to 12 inches. The low densities of seedling reproduction in this stand are characteristic of lowland forests, as are low densities in the sapling class. Conditions for germination are frequently poor, due to flooding. The dominant seedling reproduction is silver maple, which are easily drowned out, and are likely to be destroyed by subsequent floods.

2.22 Dense thickets of willow, 8 to 10 feet tall, are occasionally found on exposed areas. These areas usually do not have an overstory and the willow is sufficiently dense to preclude the growth of any groundcover.

2.23 Groundcover is very sparse due to frequent spring flooding. The dominant species at Lake Rebecca are grape, nettle, violet, Virginia creeper and jewelweed. Occasionally, dead sprouts of ash and other species make it difficult to walk through portions of the area but usually the understory is open with no groundcover.

2.24 Along the upper east shore of the lake are a series of wetland sloughs. Most of them would be classified as Type II and III wetlands (USFWS Circular 39) with sedges and rice cutgrass the dominant vegetation. Occasional stands of arrowhead are found in parts of these sloughs. One of the sloughs has been flooded by a small beaver dam and the water levels in this slough are more indicative of a Type IV wetland (USFWS Circular 39).

2.25 A wetland of 13-15 acres lies adjacent to the dike and about 750 feet east of the lake. Various portions of this wetland would be classified Types II, III, IV and VI (USFWS Circular 39). The

eastern one-third of the area is primarily sedges, grasses and cattails with no open water. The western two-thirds of the wetland is much wetter. Cattails, arrowheads, swamp milkweed, beggar's tick, and rice cutgrass are all common in this part of the wetland with each species dominating in small patches scattered over the entire area. A small area of open water remains in the center of this western portion.

2.26 The overstory on the steep hillside on the west bank of Lake Rebecca is a mixture of deciduous trees with some red cedar. The west slope is drier than the east side of the lake, with more mature oak and ash in the overstory. In areas where the overstory is not dominated by mature deciduous trees, red cedar can be found. The understory is dense on much of the west slope because of second-growth hardwoods.

2.27 The variety of plant communities offers considerable opportunity for interpretive nature trails and environmental education programs. The northeast section of the project area has the most diversity and provides the best opportunity for trail development.

2.28 Fish and Wildlife - Lake Rebecca has had a recorded history of frequent winterkill since the mid-1940's. Low oxygen levels have resulted in the lake's winterkilling in 26 of the last 33 years. There is no record of winterkill prior to that time, as the Minnesota Department of Natural Resources (DNR) did not begin keeping winterkill records until the 1940's.

2.29 The lake supports dense populations of young-of-the-year gizzard shad, carp and buffalofish, with some averaged-sized black crappie, small largemouth bass, small bluegills, and small northern pike present. The lake contains fair to good spawning habitat for panfish species. Most of the game fish and rough fish found in Lake Rebecca come from the Mississippi River.

2.30 Fishing success for game fish and most panfish on the lake has declined since the mid-1940's. Present observations and local reports indicate that Lake Rebecca has been fished little in the last few years and angling success has been poor, with some fair to good success for crappies, bullheads, and rough fish. The lake is open to promiscuous angling (no limit on size or quantity) during most winterkill periods.

2.31 Lake Rebecca has some desirable natural attributes for wildlife habitat. The marshes at the upper riverward shore of the lake are attractive to wildlife. Herons and egrets have been observed using the area.

The wetlands have value as waterfowl habitat and Lake Rebecca probably serves as a resting stop for migrating waterfowl.

2.32 No specific wildlife surveys have been conducted on the site but numerous sightings and sign observations have been made during vegetation surveys, water quality sampling trips, etc. The area appears to be used by the typical mammals of a floodplain forest such as white-tailed deer, raccoon, and gray squirrel. The wetlands and the lake are used by muskrat and beaver. Numerous waterfowl have been observed, including a hen mallard with six young on 22 July 1976. The area abounds with songbirds, and ruffed grouse and pheasants have been seen on the site.

2.33 Conditions for fish and wildlife can be enhanced or maintained. Winterkill of fish can be diminished by increasing the depth of the lake and increasing the amount of oxygen in the water. The sport fishery can be reestablished by the eradication of rough fish, stocking the water with sport fish, and controlling the reentry of rough fish from the Mississippi River. Habitat for waterfowl can be improved by increasing the size of feeding and nesting areas and providing open water in the winter. Not developing the areas where wildlife exists will help preserve the animal species presently on the site.

2.34 Aesthetics - The visual quality of Lake Rebecca can best be described in terms of the form, line, color and texture that exist in the landform, water, vegetation, and land use pattern.

2.35 The contrast in landform between the east and west sides of Lake Rebecca is striking. The east side of Lake Rebecca is gently sloping to nearly flat while on the west side a steep slope rises abruptly from the water's edge. In the northern portion of the site there is only a subtle change in landform between the wetlands and the surrounding wooded area, but this change in landform causes a major change in the vegetation.

2.36 Great variety and diversity exist in the color and texture of the vegetation in the Lake Rebecca area. The heavily wooded area of the site, with its dense canopy of deciduous vegetation, is a multitude of green colors in the spring and summer. The uneven texture of the leaves and groundcover vegetation contrasts with the smooth texture of the tree trunks and branches. As the seasons change from summer to fall to winter, the dominant colors in the landscape change from bright greens to the yellow and golds of the leaves, to the browns and whites of the trees and snow.

2.37 The scenic composition of the wetland areas is constantly changing with the change in water level. In the spring, water is a dominant element; but as the water recedes, the sedges and grasses become dominant. The green linear form of the marsh grasses is interrupted by bright red and lavender blooms of the cardinal flower, swamp milkweed and other herbaceous plants. As winter approaches, the dominant green color fades to tan and brown.

2.38 The strongest visual impression at Lake Rebecca is created by the curvilinear shoreline with its heavily wooded slopes. Views from the shoreline are usually framed by the tall deciduous trees at the shoreline, giving a feeling of seclusion. The entire lake is not visible from any one point, giving a feeling of anticipation and adding an element of surprise. By the careful location of trails and other facilities, these views can be utilized and still preserved.

2.39 The most noticeable man-made elements on the site are the horizontal line made by the Pool No. 2 dike, the light-colored oil pipeline paralleling the dike, the powerline with its clearing strip cutting through a major portion of the site, the litter and trash strewn through the site, and the cleared area of an abandoned ball field. The concrete foundation from an old farmstead and the service road for the powerline are existing man-made features that do not detract significantly from the visual quality of the site. Efforts would be made to minimize any negative effects of the man-made elements if the site is developed.

2.40 At Lake Rebecca the edge created where land and water meet is visually attractive but the water lacks clarity and reflectivity. The water's turbidity is mainly the result of carp activity. The water clarity would be improved by implementing the development plan. Improved water clarity would greatly enhance the visual quality.

2.41 Land Use - Lake Rebecca is in Pool No. 3, but is included in the Pool No. 2 master plan due to its location immediately below the dam. These lands are presently zoned recreational (developed). No development now exists on the lake's shores.

2.42 The lock and dam of Pool No. 2 are located on the extreme north corner of the project area. Also in this area are the dam tender's buildings and the Corps-constructed restrooms. A dike extends in a westerly direction from the locks and separates Lake Rebecca from Pool No. 2.

2.43 Though not visible from the lake, private residences line the hilltop on the south and west bank of the outlet channel. A cemetery is located on the hillside and hilltop along the west bank of the lake. Foundations of former farm buildings are located to the east of the lake on the southern portion of the project area (plate 1).

2.44 To allow water to drain from Lake Rebecca into the Mississippi River, a concrete culvert (6' x 6.5') has been placed under the access road and railroad roadbeds at the downstream end of the outlet channel (plate 1). A paved access road to the locks and dam from Hastings parallels the Mississippi River. Also paralleling the river are railroad tracks which stop within the Koch Refining Company tank farm adjacent to the access road.

2.45 A 69kV NSP powerline bisects the area in an east-west direction. A seven-foot-square concrete city storm sewer outflow structure is located on the hillside of the southwest corner of the lake. An oil pipeline coming from the west parallels Pool No. 2 dike a few feet off the ground on the Lake Rebecca side of the dike. Near the dam tender's house the pipeline runs underground in a southerly direction to the tank farm and is no longer visible. The powerline, the oil pipeline, and the storm sewer create the most obvious negative aesthetic and environmental impacts.

2.46 Land Ownership - The project area consists of approximately 195 acres. About 130 acres is federally owned land under Corps of Engineers jurisdiction. (The lake is not included in the 130-acre figure.) A portion of the 130 acres is subject to a pipeline easement for the Koch Refining Company. The remaining land is privately owned.

2.47 Lands adjacent to Lake Rebecca on the south and west are privately owned. Those lands to the north (except some privately owned city lots which extend to the north side of the outlet channel) and east (except for the Koch petroleum storage area) are federally owned. There is also a small area on the west side of the lake adjacent to the Pool No. 2 dike which is federally owned property (plate 1). Under present regulations, it is currently felt that some land would need to be set aside by the city of Hastings through easement and zoning (plate 2).

2.48 Access - Public access to Lake Rebecca is presently a one-lane dirt road which crosses Koch Refining Company land and Federal land. During dry periods this road can provide limited access to a raised strip of land adjacent to the southeast portion of the lake. The dirt road extends from a two-way paved road that connects Lock and Dam No. 2 facilities to Hastings.

2.49 Utilities - The city of Hastings water and electric lines are within a few blocks of the planned recreation area (plate 1). A 12" water line is located under Spring Street and turns east on Second Street. The 12" line intersects a 6" line that runs west on Second Street.

2.50 Cultural Resources - Under the mandate of the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, Executive Order 11593, and the Archaeological and Historical Data Conservation Act of 1974, the Corps is required to locate, inventory and nominate to the Secretary of the Interior all sites, buildings, districts and objects under its jurisdiction or control which appear to qualify for listing on the National Register of Historic Places. These tasks have not yet been accomplished in the Lake Rebecca area. However, the limited data that we do have suggest that diverse groups of prehistoric and historic peoples have inhabited the region.

2.51 The artifacts and site materials which are the tangible cultural resource base of an area are significant to public use development in two major ways. First, the Corps is explicitly responsible for the protection, preservation, and enhancement of cultural resources located within areas of its jurisdiction and impact. Second, cultural resources are literally a resource with development potential. Attending to the first responsibility will often be the first step toward realizing the development potential of the resource base.

2.52 Cultural resource investigations, including review of documents, site surveys and test excavations, will be carried out prior to construction in order to locate the resources and to assess their significance to present and future generations. Once known, the cultural materials can be evaluated for their suitability for incorporation into interpretive facilities of various sorts, such as self-guided walking trails, educational displays, and reconstructed buildings and sites.

2.53 There are a number of significant prehistoric, historic, and architectural resources in the Hastings vicinity. The Minnesota Historical Society has identified the Freitag Mounds, the Nininger Mound, the Dakota County Courthouse, the Gardner Hotel, the Gardner Mill, the Ramsey Mill, Guardian Angels Church, the J.F. Norrish House, and the Allen E. Rich House as important cultural resources in the Hastings area. In addition to these, the Le Duc House has been given recognition as a Nationally Registered building because of its historic and architectural significance. These known sites and properties provide the background and a context for expectations and interpretation of any cultural resources that may be located in the project area.

2.54 The Hastings vicinity is reported to have been occupied during historic times by groups of Indians, probably Siouan. According to a local historian, there was an Indian camping ground located at the present site of Hastings, and an old Indian trail along the western bluff of Lake Rebecca. The island between Lake Rebecca and the Mississippi was very likely utilized by prehistoric and historic Indians for fishing, hunting and/or habitation.

2.55 There are several stone and concrete foundations where the proposed recreation facilities will be located. The Dakota County Registrar of Deeds has records of the island property being owned as far back as 1855. Additional record and literature research and field testing will be necessary to determine the age and significance of these foundations. There may be additional historic remains in the impact areas that have not yet been identified. When the field survey and necessary testing are completed, the scientific and educational potential of the cultural resource base of the project area will be assessed and procedures will be established for its protection.

2.56 Population - The populations for both Hastings and Dakota County have shown continuous growth since the base year of 1950 (see table 1). Most of this growth is attributable to movement outward from the more crowded housing of the Minneapolis-St. Paul urban area. The availability of space in this area, in contrast to the older, densely populated suburbs, also allows for a greater population increase due to new immigration from outside the metropolitan area.

SECTION TWO

FACTORS INFLUENCING RESOURCE DEVELOPMENT

Much of this migration from outside areas to urban fringe areas such as Dakota County may be in response to employment opportunities generated by continuing economic growth in the industrial central urban zone.

Table 1 : Historical and Projected Population Data for Hastings and Dakota County, Minnesota

| <u>Year</u> | <u>Hastings</u> | | <u>Dakota County</u> | | |
|-------------|-----------------|-----------------|----------------------|-----------------|--------|
| | <u>No.</u> | <u>% Change</u> | <u>No.</u> | <u>% Change</u> | |
| .1950 | 6,560 | - | 49,019 | - | |
| .1960 | 8,965 | +36.7 | 78,303 | +59.7 | |
| .1970 | 12,195 | +36.0 | 139,808 | +78.5 | |
| †1976 | 13,425 | +10.1 | 184,113 | +31.7 |] 42.6 |
| *1980 | 13,800 | + 2.8 | 199,300 | + 8.2 | |
| *1990 | 17,000 | +23.2 | 273,250 | +37.1 | |
| *2000 | 20,500 | +20.6 | 328,900 | +20.4 | |

. U.S. Census Bureau

† Metropolitan Council, current estimate

* Metropolitan Council forecasts

1 Total % Changes 1970-80

3.00 RECREATION DEMAND, SUPPLY, AND NEEDS

3.01 General - The Lake Rebecca project has the potential of attracting a large number of recreationists because of its location, aesthetic qualities, and unique combination of recreation opportunities. Numerous State highways provide access to the city of Hastings and the project is within an hour's drive of most of the Minneapolis-St. Paul metropolitan area. Within the city of Hastings, the only access is by the paved road to Lock and Dam No. 2. The lock and dam road would provide safe and orderly access to the project.

3.02 Zone of Influence - Based on professional judgment, it is assumed that at least 80 percent of the recreation use at the Lake Rebecca project would come from recreationists residing within a 20-road-mile radius of the project (figure 5). This 20-road-mile zone of influence includes population within five counties: portions of Dakota, Washington, and Goodhue Counties in Minnesota, and of St. Croix and Pierce Counties in Wisconsin. The population within this zone is projected to reach approximately 219,000 by 1980 and increase to 814,000 over the next fifty years. (See table 2.)

RECREATION DEMAND, SUPPLY, AND NEEDS

FIGURE 5:



RECREATION MARKET AREA -ZONES OF INFLUENCE-

_____ 10 ROAD MILES
 _____ 20 ROAD MILES

SECTION THREE

RECREATION DEMAND, SUPPLY, AND NEEDS

TABLE 2

LAKE REBECCA
ZONE OF INFLUENCE POPULATION PROJECTIONS ^{1/}

State Projections: (Figures are rounded to nearest 100, and expressed in thousands.)

| <u>County</u> | <u>1980</u> | <u>1990</u> | <u>2000</u> | <u>2010</u> | <u>2020</u> | <u>2030</u> |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <u>Minnesota</u> | | | | | | |
| Dakota * | 147.6 | 212.9 | 272.1 | 333.7 | 393.8 | 452.9 |
| Washington* | 47.9 | 81.9 | 124.5 | 173.2 | 230.3 | 295.7 |
| Goodhue ^{2/} | <u>4.9</u> | <u>5.9</u> | <u>7.0</u> | <u>8.2</u> | <u>9.4</u> | <u>10.7</u> |
| Subtotal: | 200.4 | 300.7 | 403.6 | 515.1 | 633.5 | 759.3 |
| <u>Wisconsin</u> | | | | | | |
| St. Croix ^{3/} | 9.7 | 13.5 | 17.7 | 24.3 | 28.5 | 32.4 |
| Pierce | <u>9.3</u> | <u>11.8</u> | <u>14.6</u> | <u>17.6</u> | <u>20.3</u> | <u>23.0</u> |
| Subtotal: | 19.0 | 25.3 | 32.3 | 41.9 | 48.8 | 55.4 |
| Total: | 219.4 | 326.0 | 435.9 | 557.0 | 682.3 | 814.7 |

* Projections for these counties taken from Metro-Council "Development Framework - Policy, Plan, Program" - 9/75

^{1/} All projections extrapolated from 2000-2030 using base data provided. OBERS projections were not used as State estimates for metro-counties were considered to be more reliable.

^{2/} Minnesota population projections 1970-2000, Office of State Demographer, State Planning Agency, November 1975.

^{3/} Wisconsin population projections, 3rd Edition, June 1975 - Department of Administration - Madison, Wisconsin.

3.03 Recreation Potential - No reliable recreational use surveys have been conducted within the project area. Determination of recreational needs for purposes of justifying the project is based on the application of planners' judgment and a review of available literature. Important resource documents utilized included local, county, and State recreation plans.

3.04 The majority of the zone of influence is located in region 11 as defined within the Minnesota State Comprehensive Outdoor Recreation Plan (SCORP). The SCORP indicates a deficiency of facilities for all of the activities to be provided at the Lake Rebecca project. For example, in Region 11 (which includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington Counties) a deficiency of over 1.2 million square feet of swimming area will exist by 1980 and 2.5 million square feet by 1990. Significant resource deficiencies are also indicated for hiking, picnicking, water access and trails.

3.05 The document "County Parks and Recreation Facilities Plan - Dakota County, Minnesota,"¹ indicates that the 1985 demand for open space to accommodate land-based recreation uses would be 7,863 acres in Dakota County. By subtracting the acreage of existing parks and recreation areas from the projected demand for recreation space, over 5,000 acres of open space must be added within the county by 1985 to meet the projected recreation demands.

3.06 In the local document "Park System Plan - Hastings, Minnesota,"² the section on Recreation Needs Surveys provides the following information on the recreation activities desired by the citizens of Hastings:

"Hastings has periodically undertaken citizen surveys of recreation needs. The surveys have shown a mixed result. Nevertheless, those activities receiving the greatest interest are the non-team activities in which one can participate at one's own speed and level, without the need to form a team.

¹ Dakota County Planning Advisory Commission, November 1970; amended March 1971.

² Natural Resources Commission, October 1975.

"The majority of the participants engaged in hiking as a priority recreation activity. Other strong leisure time pursuits were fishing, swimming, skiing, biking, tennis and skating. Secondary interests included softball-baseball, snowshoeing, golf, hunting, canoeing and bowling. The group felt that bike trails and hiking trails were the most needed recreation facilities that would improve recreation for their households. Improved parks and picnic areas and places for crosscountry skiing also received high scores."

For the Lake Rebecca project the priorities stressed by local citizens at coordination meetings were for swimming, nature study, hiking, bicycling, fishing, picnicking and crosscountry skiing. These suggestions provided guidance for determining the mix of recreation facilities to be developed at Lake Rebecca.

3.07 Projected Public Use - For purposes of estimating project use, the assumption is made that because of the great demand for recreation opportunities within the zone of influence (table 3), any recreation facilities provided at Lake Rebecca would receive maximum public-use pressure. Recreation use at Lake Rebecca would be limited only by the design capacity of the site and its facilities. Tables 4 and 5 provide information on the estimated day-use capacity for recreation opportunities at Lake Rebecca.

3.08 The annual estimated use of the Lake Rebecca project is approximately 90,200 recreation days, which is an estimated 2.5 percent of the total potential recreation demand within the zone of influence for the activities identified above. Therefore, the facilities to be provided at Lake Rebecca can meet only a very small portion of the recreation demand identified in the Lake Rebecca zone of influence. In review of the previously mentioned literature, and considering this analysis of project area demands and needs, it is projected that the recreation facilities to be provided in the Lake Rebecca project will receive maximum public-use pressure.

SECTION THREE

RECREATION DEMAND, SUPPLY, AND NEEDS

TABLE 3:
ESTIMATED RECREATION DEMAND*
WITHIN PROJECT ZONE OF INFLUENCE 1/

| SCORP ACTIVITIES | Demand Projections 1980-2030 (in 1,000's) | | | | | |
|-------------------------|---|--------------|--------------|--------------|--------------|--------------|
| | 1980 | 1990 | 2000 | 2010 | 2020 | 2030 |
| Picnicking | 1,251 | 2,054 | 2,746 | 3,509 | 4,298 | 5,133 |
| Swimming | 4,344 | 7,465 | 9,982 | 12,755 | 15,625 | 18,657 |
| Fishing | 1,733 | 2,738 | 3,662 | 4,678 | 5,731 | 6,844 |
| Boating (25%) <u>2/</u> | 72 | 108 | 144 | 184 | 225 | 269 |
| Canoeing <u>3/</u> | 174 | 306 | 410 | 524 | 641 | 766 |
| Pleasure Walking | <u>2,194</u> | <u>3,586</u> | <u>4,795</u> | <u>6,127</u> | <u>7,505</u> | <u>8,962</u> |
| | 9,768 | 16,257 | 21,739 | 27,777 | 34,025 | 40,631 |

* (Demand expressed in recreation activity occasions)

1/ Demand Formula: Minnesota SCORP Activity Per Capita Use Rate X Market Area Population = Area Activity Demand in Activity Occasions (SCORP Per Capita Rates held constant after 1990).

2/ Project boating would consist of small, non-motorized fishing boats - assume 25% estimated demand for all boating demands.

3/ Canoeing per capita use rates were for Region 11, Minnesota SCORP.

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RECREATION DEMAND, SUPPLY, AND NEEDS

TABLE 4
RESOURCE USE ESTIMATE

1. Assumed supply and resource capacity

| <u>Activity</u> | <u>Available Area^a</u> | <u>Area per Unit</u> | <u>Supply or Units</u> |
|-----------------------|-----------------------------------|-------------------------------|------------------------|
| Picnicking | | | 35 tables |
| Boating | 24 surface acres | 1.5 acres/boat | 16 boats |
| Fishing | 20 surface acres | 1.0 acres/boat | 20 boats |
| Canoeing | 19.5 surface acres | 1.5 acres/canoe | 13 canoes |
| Hiking | | | 0.79 mile of trail |
| Swimming | 30,000 sq. ft. sand beach | 50 sq. ft. sand beach/person. | 600 persons |
| Nature Interpretation | | | 2.5% of total use |

2. Design capacity values

| <u>Activity</u> | <u>Supply or Units (U)</u> | <u>People/Unit (P)</u> | <u>Turn-over Rate (T)</u> | <u>Length of Season in weeks (S)</u> | <u>Percent of Weekly Use that Occurs on Average Week-end Day (W)</u> | <u>Percent of Yearly Use that Occurs During Recreational Season (Y)</u> |
|-----------------------|----------------------------|------------------------|---------------------------|--------------------------------------|--|---|
| Picnicking | 35 tables | 4 | 2 | 18 | 30 | 70 |
| Boating | 16 boats | 3.0 | 2 | 18 | 25 | 65 |
| Fishing | 20 boats | 2.5 | 2 | 18 | 20 | 65 |
| Canoeing | 13 canoes | 2 | 2 | 18 | 20 | 65 |
| Hiking | 0.79 mile trail | 16 | 4 | 18 | 20 | 65 |
| Swimming | 600 persons | 1 | 2 | 14 | 25 | 95 |
| Nature Interpretation | 2.5 percent of total use | | | | | |

3. Formula

$$X = \frac{UPTS}{WY}$$

where: X = Capacity of Recreation Use in Activity Occasions.

NOTE: Season is expected to range from 1 May to 1 September.

^aUseable areas are based on probable distribution of boating activities as influenced by physical characteristics of the lake. Approximately 8.5 acres of the lake will not be conducive to any boating activities due to expected wildlife management programs.

SECTION THREE

RECREATION DEMAND, SUPPLY, AND NEEDS

TABLE 5
ESTIMATED ANNUAL USE - CAPACITY¹

| <u>Activity</u> | <u>Activity Occasions</u> |
|---|---------------------------|
| Picnicking | 24,000 |
| Boating | 10,633 |
| Fishing | 13,846 |
| Canoeing | 7,200 |
| Hiking | 7,000 |
| Swimming | <u>70,737</u> |
| Subtotal | 133,416 |
| Nature Interpretation 2.5 Percent | <u>3,336</u> |
| | <u>TOTAL 136,752</u> |
| Estimated Annual Capacity | approx. 136,800 |
| Existing Use | <u>-1,500</u> |
| Projected Annual Activity Occasions | 135,300 |
| Conversion Factor for Activity Occasions to Recreation Day | $\div 1.5^2$ |
| Projected Annual Use Related to Project in Recreation Days | 90,200 |

¹ See formula - Table 4.

² The 1.5 conversion factor (activity occasions to recreation days) was based on professional evaluation of expected user patterns at the project. It is assumed that on weekends and evenings, most users will be area families who will participate in swimming and picnicking (supervising) at the same time. On weekdays, most users will be local youth participating in swimming only, or area fishermen using the lake for fishing only.

4.00 PLAN FOR DEVELOPMENT

To provide a basic understanding of the plan for development, a detailed discussion of each design feature is presented. Alternatives to the proposed design features are discussed in Section 5.

4.01 Control Structure - Lake Rebecca has no inlet and currently outlets via a culvert into the Mississippi River. A lake level control structure would be constructed in the northeast end of the dike (plates 2 and 3). The structure (exhibit 3) is designed to:

- a. prevent rough fish entry into the lake from the Mississippi River
- b. maintain the elevation of the lake at 680.0
- c. prevent Mississippi River floodwaters from backing up into the lake

4.02 The control structure would have a stop-log spillway with a range in control from 675.0 (normal Mississippi River elevation) to 690.0. The lake would be maintained at 680.00. The stop logs could be removed down to 675.0 if at some time in the future it is desired for management reasons to return the lake to its present elevation. The structure is designed to be vandal proof and to prevent access to the stop logs by anyone other than maintenance personnel.

4.03 The structure is designed to control rough fish with a 5-foot vertical drop. Normal Mississippi River elevation is 675.0 and the lake would normally be maintained at 680.0 (see Lake Raise). When the Mississippi River levels rise during flooding, additional stop logs would be added to maintain the 5-foot drop. When the stop logs reach 690.0 and the river rises above 685.0, the 5-foot drop would begin to diminish. However, at this time the stop logs would be flush with the top grating and this grating would act as a barrier to fish.

4.04 The structure should control adult rough fish at all times. However, as the river rises to 690.0 and higher, smaller rough fish could pass through the grating. If the Mississippi rises above 691.0, it will top the road and all rough fish control would be lost.

4.05 Figure 6 is a bar graph showing the maximum tailwater elevation frequency for the period 1939-1973. Mississippi River floodwaters would no longer back up into the lake until they reached the 690.0 elevation. As the quality of the water leaving Pool 2 of the Mississippi River is relatively low, prevention of its entry into Lake Rebecca should upgrade the water quality in the lake.

4.06 Another aspect of controlling Mississippi River floodwaters is the protection of the recreational facilities from flood damage. The recreational facilities would be subject to flooding from interior drainage during high water periods on the Mississippi River. If interior flooding reaches elevation 686.0 (proposed elevation of the recreation structures), the city could pump Lake Rebecca water over the road to protect the recreational facilities or accept the damage as part of maintenance costs. The structures are designed to be relatively flood-damage free. If they were flooded, clean-up of silt, debris, etc., deposited by the flood waters would be required.

4.07 Lake Raise - Currently the elevation of Lake Rebecca is approximately 677.5. The elevation of the lake is maintained by a bedrock control on the outlet stream. After the bedrock control the stream drops down to 675.0 at the outlet to the Mississippi River. The lake would be permanently raised to 680.0. This would result in the flooding of 31 acres, approximately 22 acres at the upper end of the lake and 9 acres at the lower end of the lake (plate 2).

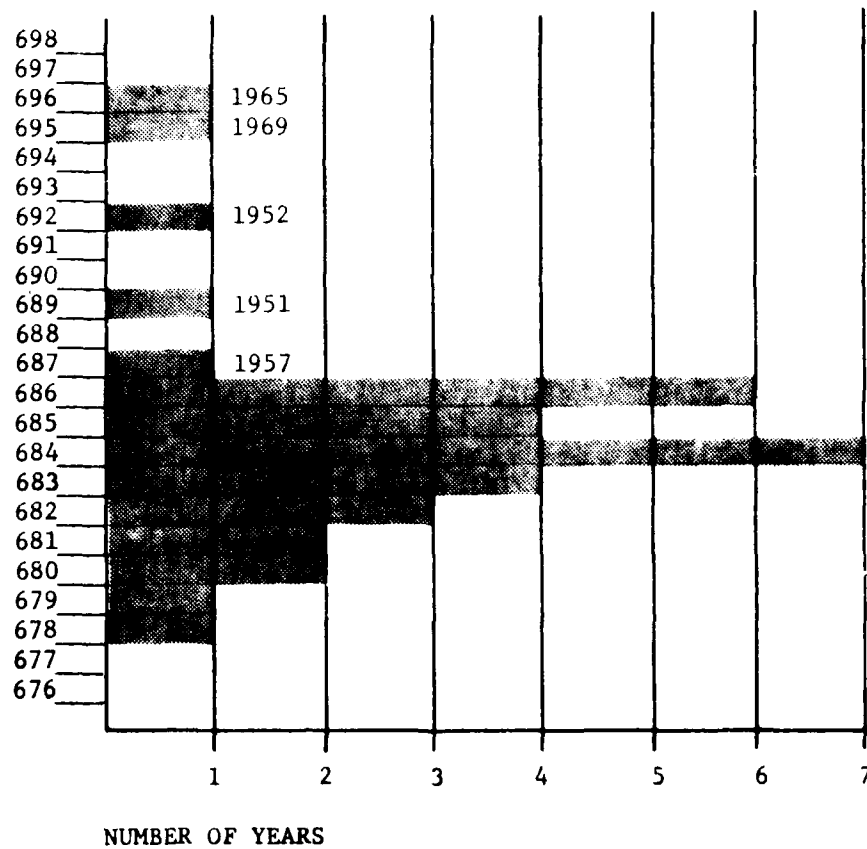
4.08 The purpose of the lake raise is primarily to provide for the 5-foot vertical drop at the control structure. An ancillary function is to provide greater depth in the lake for fish habitat enhancement and aquatic plant control.

4.09 Earthen Dike - It is proposed to prevent the storm sewer currently emptying into the outlet stream at the lower end of the lake from entering Lake Rebecca. (This storm sewer drains a 314-acre section of Hastings.) The purpose is to protect the water quality of the lake once the project is undertaken.

FIGURE 6

FREQUENCY OF MAXIMUM ELEVATION
LOCK AND DAM NO. 2 TAILWATERS 1939 - 1973

ELEVATION*



* rounded to nearest foot

4.10 Storm sewer effluent is usually characterized by high levels of suspended solids, nutrients, and fecal coliform counts. Also found at various levels of concentration (depending upon the type of development found in the drainage area) are herbicides, pesticides, tire residue, exhaust residue (lead), chlorides (street salt), general debris, heavy metals, and animal wastes.

4.11 Up until now, the storm sewer has probably had only minor impact on Lake Rebecca because during most rainfall events the storm sewer flow went directly to the Mississippi River without backing up into the lake. By raising the lake to 680.0, the outlet area becomes part of the lake. Thus, each time it rains the storm sewer effluent would flow into Lake Rebecca. This could lead to a substantial buildup of pollutants and nutrients in the lake.

4.12 Another problem would be health hazards associated with the high fecal coliform counts found in storm sewer effluents. With the beach area located a short distance away, fecal coliform counts at the beach area could exceed health standards every time it rains.

4.13 In the draft plan for development it was proposed to divert the storm sewer from the lake via an 84-inch reinforced concrete pipe (RCP) that would bypass the lake and empty directly into the Mississippi. An alternative discussed in the draft report was to construct a dike to separate the storm sewer from the lake. Subsurface investigations since the circulation of the draft report have revealed that the cost of the diversion RCP would raise project costs beyond the capability of the local sponsor. Therefore, the alternative of a dike is now the proposed method for keeping the storm sewer effluent from entering the lake.

4.14 A 900-foot dike would be constructed from the lock and dam access road to the bluffs upstream of the storm sewer outfall (see plates 2 and 3). The top elevation of the dike would be 692.0, about 16 feet over the present surface elevation. The upstream slope would be 1:5 while the downstream slope would be 1:3. The slopes would be grassed, except for an area of riprap where the storm sewer effluent would strike the southwest end of the dike. Access to the levee would be controlled by fencing. Only operation and maintenance personnel would be allowed on the dike.

4.15 Powerline Relocation - The 69 kV electric transmission line passes over the proposed beach and many of the poles would be in the water. For safety and aesthetic reasons, part of the powerline would be relocated. The new location is shown in plate 2. No relocation would be needed outside the project area.

4.16 On the portion of the new powerline located on the property line between Koch Refining Company and Federal property, 40 feet of clearing is needed on Federal property. A 75-foot clearing strip is necessary along the rest of the powerline. Northern States Power Company concurs in the proposed relocation route and would design and construct the new powerline. They have indicated a willingness to absorb part of Hastings's financial share of this relocation. Plantings which provide food and cover for wildlife and do not interfere with the powerline will be planted on the Federal property in the right-of-way.

4.17 Fish Eradication and Restocking - This phase of the project would be carried out by the Minnesota Department of Natural Resources (DNR) with local and Corps assistance. The DNR would eradicate the existing fish population of the lake in late summer or early fall after the control structure is constructed and operating. Prior to eradication, as many fish as possible would be salvaged from the lake, either through promiscuous fishing, commercial contract, by DNR crews, or by some combination of these methods. The lake may also be lowered a few feet by pumping, to concentrate the fish and facilitate the eradication procedure.

4.18 The fish would be eradicated by use of Rotenone. The toxicant would be effective and would degrade to a non-toxic substance within a few days. The poisoned fish would not be fit for human use. They would be collected and disposed of in a sanitary landfill.

4.19 In a few weeks following eradication, the lake would be restocked with fingerling walleye (Stizostedion vitreum) and largemouth bass (Micropterus salmoides). The following spring, northern pike (Esox lucius) and bluegills (Lepomis macrochirus) would be stocked. The walleye are not expected to reproduce but should grow fast in the lake and provide walleye fishing for a few years. Eventually the lake is expected to support a northern pike/largemouth bass/sunfish (Lepomis sp.) fishery. Catfish (Ictalurus punctatus) may be stocked to fill the niche normally filled by bullheads (Ictalurus sp.).

4.20 The management of the fishery would be the responsibility of the DNR. The DNR has indicated that the reintroduction of rough fish is probably inevitable but that periodic eradication/restocking efforts would be an acceptable burden if the fishery would sustain itself 5-7 years.

4.21 With the eradication of the rough fish, the water in the lake would clear up and vascular aquatic plant growth would return. As the lake is shallow, warm, and eutrophic, it is expected that after a few years all areas shallower than 8 feet would have profuse aquatic plant growth. Attempts to quantify the severity of the aquatic plant problem can only be speculative, as much depends upon natural water clarity, plant species and competition for nutrients from planktonic algae. Aquatic plant growth may reach nuisance levels requiring cosmetic maintenance of high-use areas such as the boat launch and beach areas.

4.22 Aeration - Mechanical aeration equipment would be installed to alleviate the chronic winterkill problem in the lake. A "Helixor" system is proposed. Though other areators were considered, the "Helixor" system was selected as it has been shown to be effective on other winterkill lakes in Wisconsin and Minnesota. A vandal-proof structure would be constructed on the east side of the lake to contain the electric motor and compressor necessary to pump air through the system. Polyvinyl chloride pipe would run from the compressor house to the "Helixor" units situated on the bottom of the lake.

4.23 Presently, it is planned to install an electric motor and compressor to handle four "Helixor" units. Four units may be more than necessary. However, it is felt that it is better to have one unit too many than one unit too few. During the final design phase of the project the exact number of "Helixors" to be installed will be determined following consultation with the DNR and the manufacturer.

4.24 In the past, winterkill conditions have become evident in the lake around 1 January. Thus the aeration equipment would have to operate from around 1 December through ice-out.

4.25 Vegetation Removal - With the raising of the lake level and construction of the recreation facilities, some vegetation removal would be necessary. At the lower end of the site approximately 9 acres which would be flooded by the lake raise would be cleared of all vegetation. As much of this area would only have 6 inches to 2 feet of water covering it, it is proposed to excavate the area with conventional earth-moving equipment to provide deeper water for boat and canoe access and

bank fishing. The vegetation in the proposed recreation area would be selectively cleared. Scattered clumps of large healthy trees would be left to provide shade and for aesthetic purposes. Only a small number of trees along the bluff-side bank would have to be removed, as the flooding would be minimal along this shoreline. The vegetation removed would be used for dimensioned lumber, firewood, and/or chipped to provide material for footpaths.

4.26 The vegetation at the upper end of the island would be left as is. Because of the relatively flat topography, it is difficult to determine what the extent of die-off of trees would be. The proposal now is to allow the trees to die off from the flooding in the first 2 to 3 years after the lake raise. At that time, a decision can be made among all Federal, State and local interests involved as to the disposition of the dead trees or whether they should be removed at all. Any remaining dead trees would provide habitat for woodducks, feeding stations for woodpeckers, and perching sites for raptors.

4.27 Bottom Shaping - When the lake is raised to elevation 680, the surface area will be increased from 41 acres to approximately 72 acres (plate 2). Without any modification to the bottom, much of the area adjacent to the proposed recreation area would be less than 1 foot deep. Consequently, it is proposed to reshape this area to increase the depth, enhancing fishery habitat, bank fishing potential, and the visual quality of this area. The material, which would be removed by bulldozer, front-end loader, and dragline, would be placed in the recreation area. Disposing of the material in this manner is advantageous because it would be used to elevate the recreation area several feet above the lake, minimizing the potential of flooding the facilities during periods of high water. Based on current estimates, approximately 69,000 cubic yards of material would be moved during the reshaping efforts.

4.28 Real Estate - The Lake Rebecca project would involve no relocations of residences or businesses. However, 23 acres of flowage easement are necessary (plate 2) to the objectives of the project and its long-term operation and maintenance. The city of Hastings would obtain all land easements necessary; no credit for these features is included in the cost-sharing calculations. In addition, scenic zoning (also to be accomplished by the city) is proposed to protect the visual quality of the area. (See paragraph 4.30.)

4.29 Flowage easements would be acquired on lands from elevation 677.5 to 691. Easements to 691 are required because project structures have the capability of manipulating the water level of Lake Rebecca to elevation 690. In addition, there is an allowance for a surcharge of 1 foot at the upper end of the lake. Flowage easement policy excludes the construction of permanent structures such as boat houses or other attached private recreational facilities

These easements will also relieve the project sponsor from liabilities to private owners in the eventuality of any future inundation in these areas. If the project were dismantled at some time, the easements would revert to the adjacent property owners.

4.30 The purpose of the suggested scenic zoning is to retain the existing visual quality of the area and prevent the development of negative man-made intrusions. Scenic zoning of approximately 40 acres would allow the City Council the opportunity to review proposed developments that would significantly alter the vegetative cover or that would propose structures that could be visible from Lake Rebecca (plate 2).

4.31 Utilities - A waterline would extend from the existing 12-inch waterline at the intersection of Spring and Second Streets. The proposed line would follow the Lock and Dam Road and enter the recreation site on the north side of the control structure. An underground electric line for the security lighting and the motor and air compressor for the aerators would extend from the existing powerline along the Lock and Dam Road. The city of Hastings would be responsible for pumping the vault toilets and solid waste disposals, as part of operation and maintenance.

4.32 Additional Fish and Wildlife Enhancement - Local service groups in the Hastings areas have indicated a desire to pay for and construct some additional fish and wildlife enhancement features. The items they could provide include wood slat fish structures, wood duck boxes for nesting, and suitable native wetland vegetation to be planted in the new wetlands.

4.33 Recreation Development - The majority of the project lands suitable for recreation development are between the Mississippi River and Lake Rebecca (see figure 7). One of the most striking qualities of the project area is its aesthetically pleasing, undisturbed natural character. Retaining this natural character while providing day-use recreation opportunities is a primary planning objective of the project. In order to meet this objective, there will be three zones of recreation development (see figure 7). Most of the intensive recreation use such as swimming, picnicking, bank fishing and water access for canoeing and boating would take place in the southern portion of the site. Because of the limited surface area of the lake, and the importance of keeping the area as peaceful and natural as possible, no outboard motors (except electric trolling motors) would be allowed on the lake. A back-in gravel boat ramp would be provided for operation, maintenance, and enforcement purposes, but this ramp will not usually be open to the public. In the northern portion of the project area, the aesthetic natural character would be retained. In this zone of development the only

recreation facilities would be hiking, nature trails, and facilities for environmental education, which would provide opportunities for sight-seeing and nature study. There would be a transition zone between the natural area and the developed recreation area. This zone would provide a gradual change from the intensive day-use recreation area to the natural area, and would act as a buffer for the natural area. The only facilities in this transition zone would be hiking trails.

4.34 Supporting facilities are necessary for each of the recreation activities. Some facilities, such as restrooms and parking lots, are shared by all visitors and are mentioned separately. Provisions will be made to insure that handicapped individuals may utilize the constructed facilities.

ACTIVITIES

FACILITIES

swimming

- sand beach - 30,000 square feet
- change house/restrooms - building 36' x 36'
- swimming area - 60,000 square feet

fishing

- canoe launch*
- bottom shaping for bank fishing
- pull-through parking spaces*

picnicking

- tables
- grills

hiking

- trail 4,600 feet

canoeing/boating

- canoe launch*
- pull-through parking spaces*

environmental education/
nature study

- trails 3,000 feet
- interpretive signs and materials

SECTION FOUR

PLAN FOR DEVELOPMENT

ACTIVITIES

FACILITIES

common to all activities

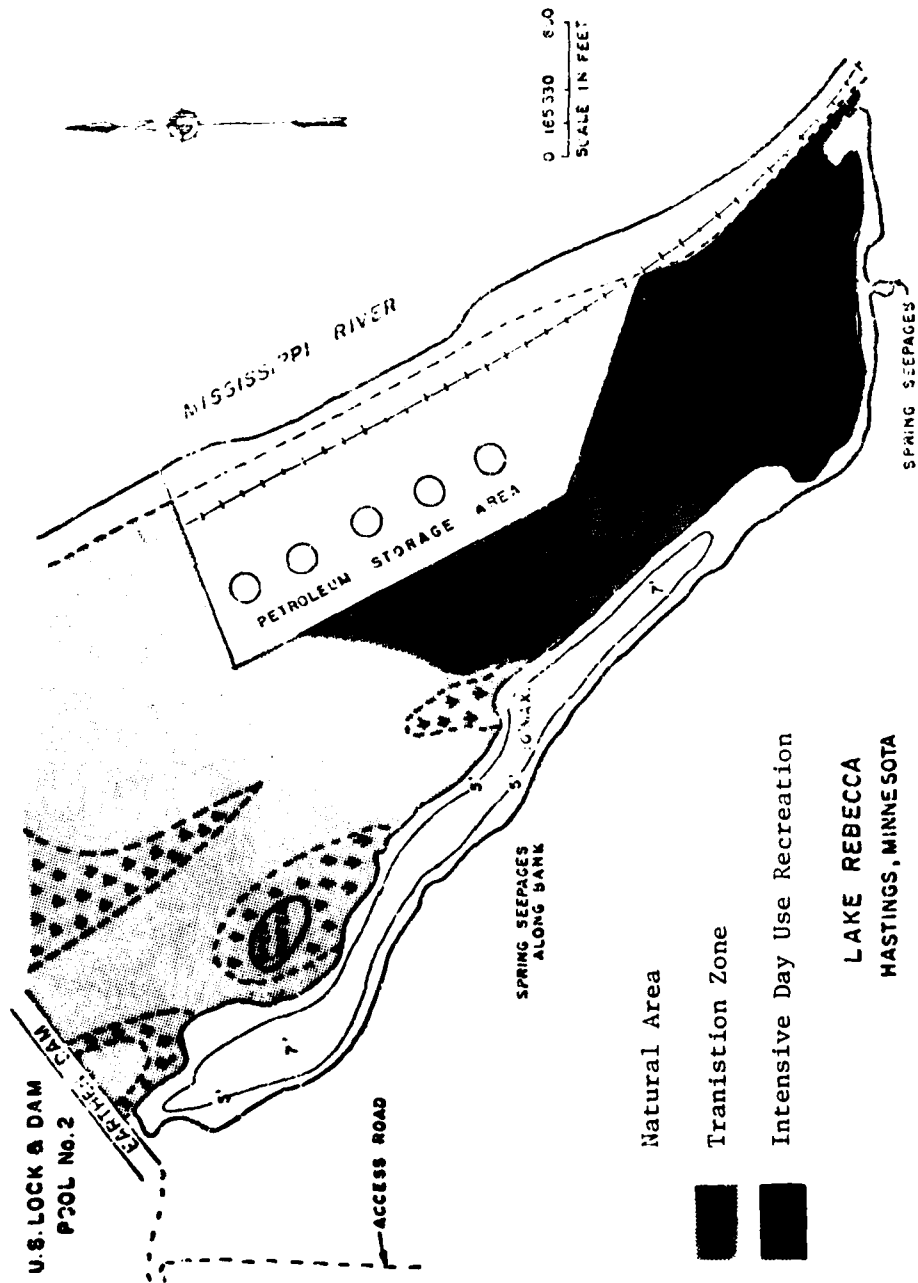
- parking - 118 total parking spaces
54 pull-through spaces
- restrooms - 3 buildings
- signing - entrance and directional
- access - roads and walks
- trash receptacles
- utilities - water, sewer, electric
- security control - gates, fencing,
and lights

* shared by two activities

Illustrations and description of the facilities are presented in design criteria.

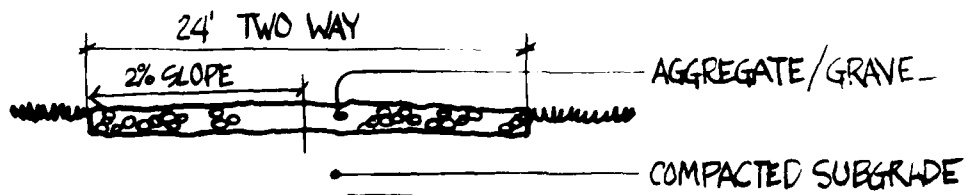
4.35 Construction of the project could significantly increase winter recreation use at Lake Rebecca. Presently, there is limited cross-country skiing use; the proposed hiking and nature trails would attract more skiers. Ice fishing may increase with the establishment of a productive sport fishery. The beach change house is planned so that it can be easily converted to a warming house for ice skaters. To greatly increase fishing and skiing, an access road and parking area would need to be maintained. For ice skating, a warming house and an area of ice would need to be operated and maintained. If in the future there is a great demand for winter recreation, the city of Hastings could consider providing the necessary funds to operate and maintain facilities for winter use.

FIGURE 7
THREE ZONES OF RECREATION DEVELOPMENT

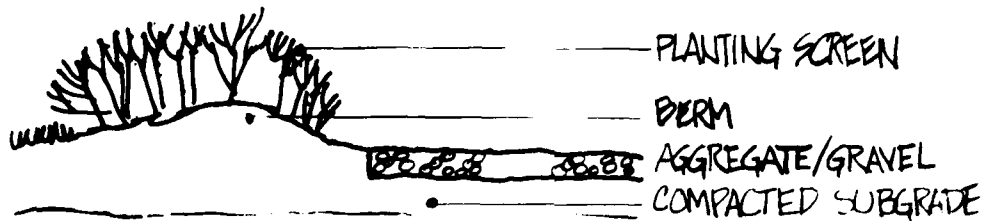


DESIGN CRITERIA

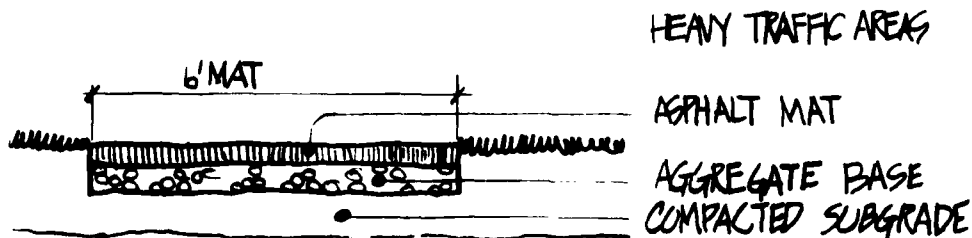
TWO-LANE GRAVEL ROAD



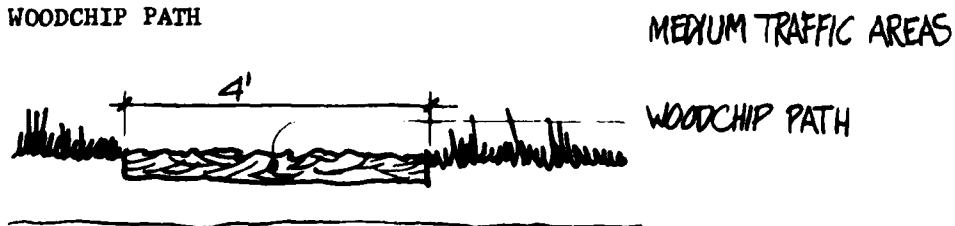
GRAVEL PARKING LOT



ASPHALT PATH

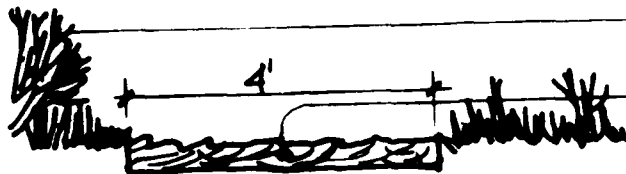


WOODCHIP PATH



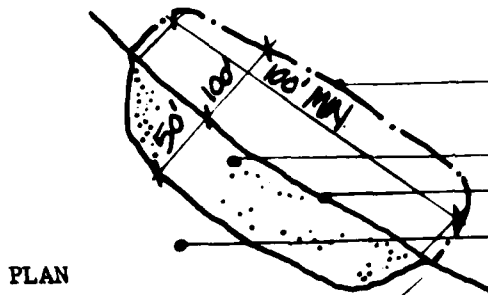
DESIGN CRITERIA

INTERPRETIVE TRAIL



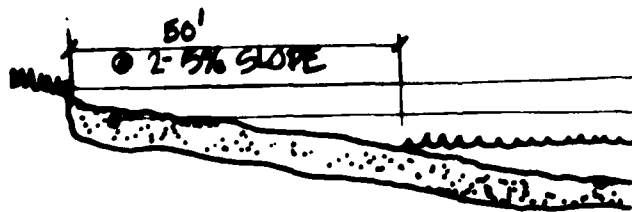
LIGHT TRAFFIC AREAS
PROMOTE NATURAL
VEGETATIVE ENCROACH
WOODCHIP PATH

SWIMMING BEACH



SWIMMING AREA
ROPES @ 5-6' DEPTH
SAND BEACH
SHORELINE
TURF AREA

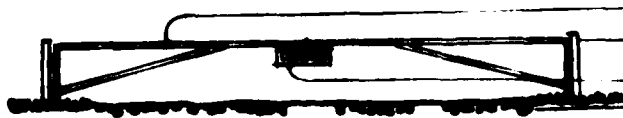
PLAN



TURF AREA
SAND BEACH
WATER LEVEL
BOTTOM LINE
5-7% SLOPE

SECTION

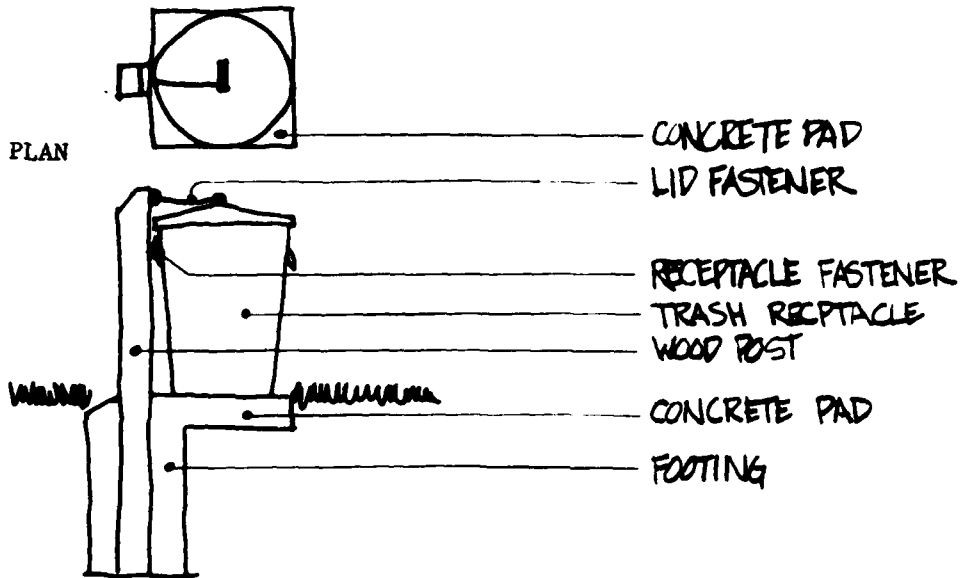
ENTRANCE CONTROL GATE



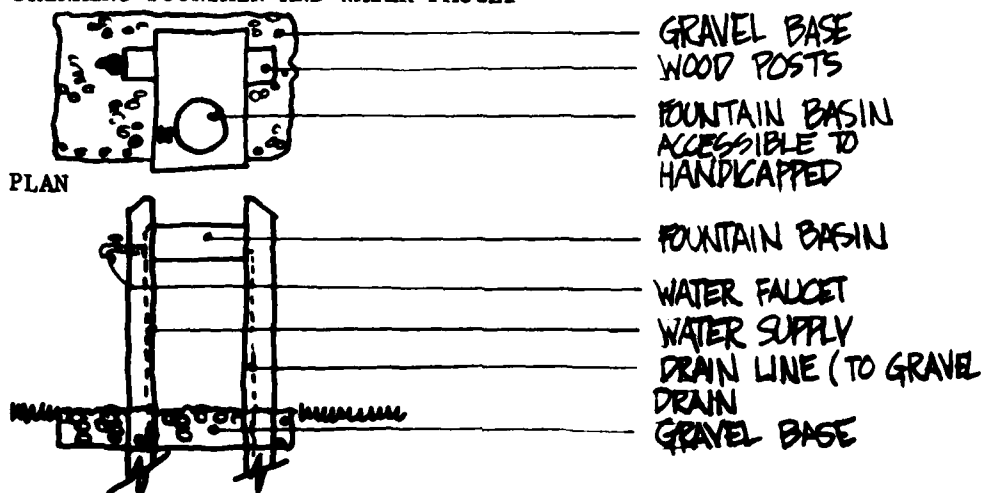
ENTRY GATE BAR
GATE BOLLARD
"AREA CLOSED" SIGN
ENTRY ROAD

DESIGN CRITERIA

TRASH RECEPTACLE



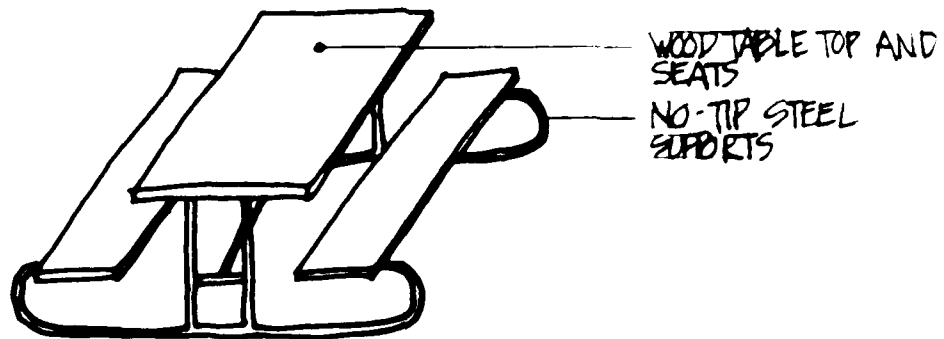
SECTION
DRINKING FOUNTAIN AND WATER FAUCET



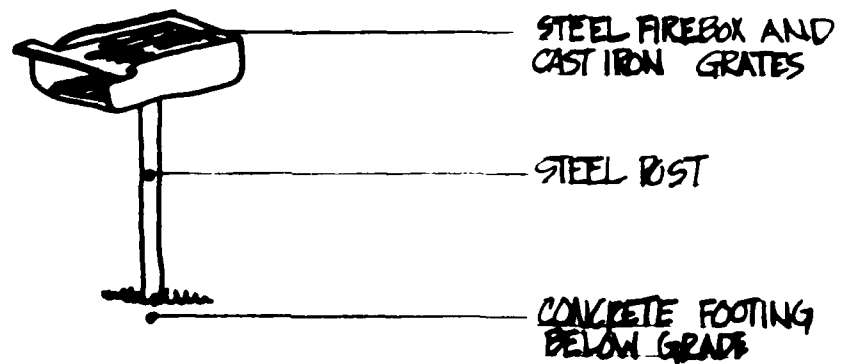
SECTION

DESIGN CRITERIA

PICNIC TABLE

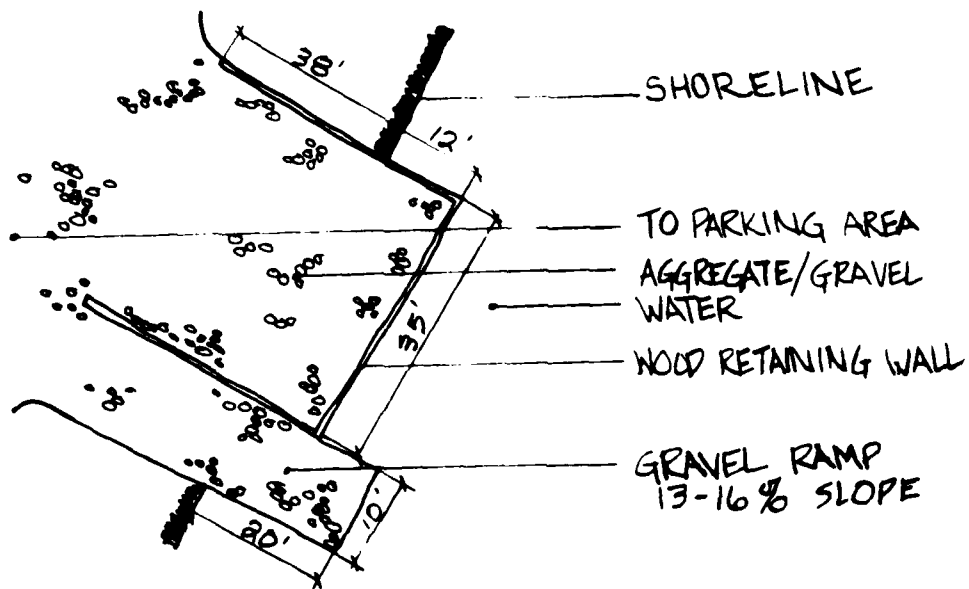


BARBECUE UNIT

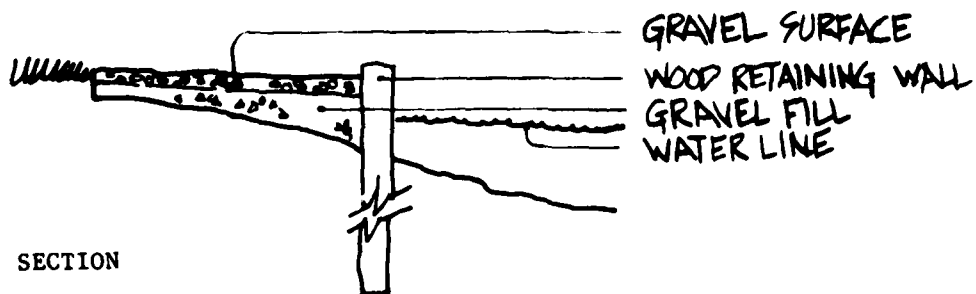


DESIGN CRITERIA

CANOE/BOAT LAUNCH



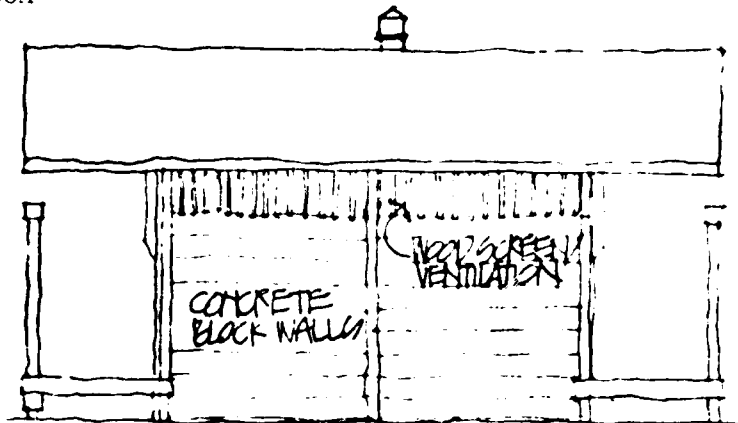
PLAN



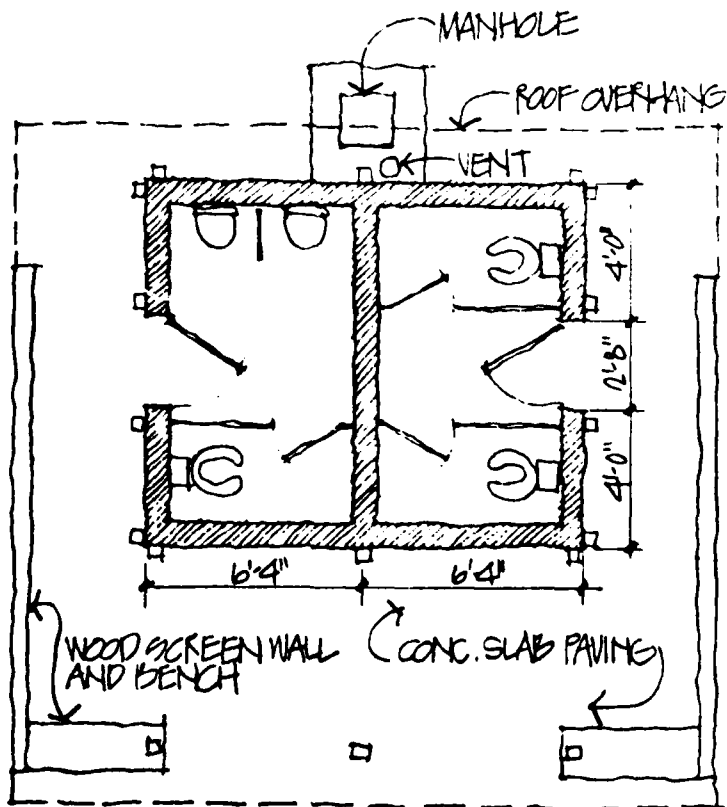
SECTION

DESIGN CRITERIA

VAULT RESTROOM



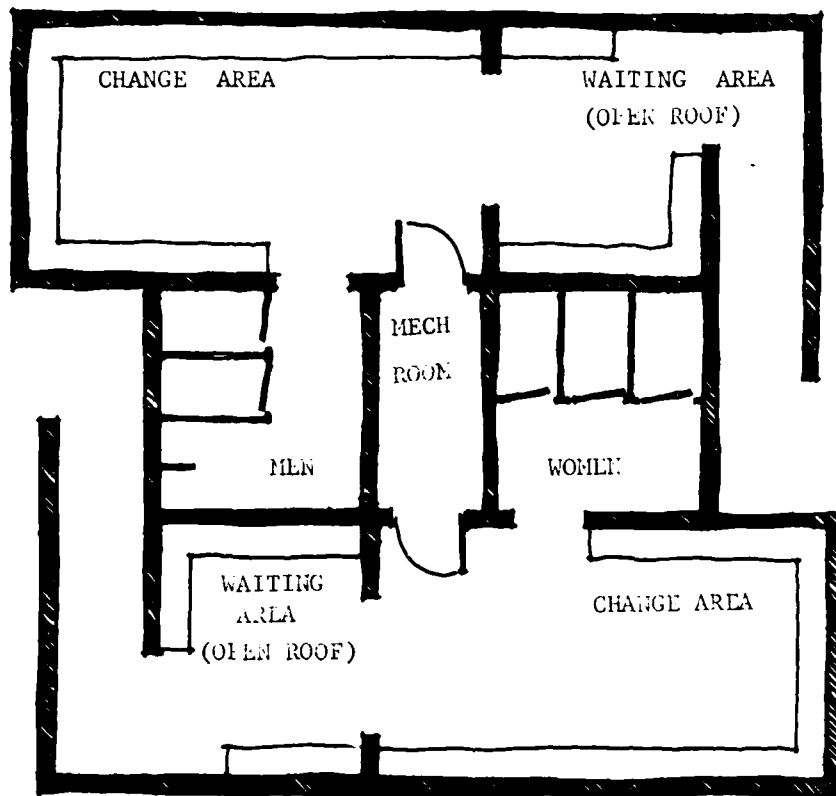
ELEVATION



PLAN

DESIGN CRITERIA

CHANGEHOUSE/RESTROOM



PLAN



ELEVATION

5.00 ALTERNATIVES TO THE PROPOSED ACTION

NO ACTION

5.01 The no action alternative would be no project at Lake Rebecca, i.e., maintenance of the existing situation. Under this alternative Lake Rebecca would remain a winterkill lake dominated by rough fish populations. Recreational usage of the lake would probably remain at about the present level.

5.02 The island would also remain relatively unchanged. The flood-plain forest is a climax ecotype perpetuated by periodic flooding. Over time, the species composition would remain the same, the density of individual species fluctuating with the periodicity of flooding. A period of years with high spring floods would tend to favor cottonwood and black willow growth, while a period of little spring flooding would favor silver maple and American elm.

5.03 It is unlikely that local interests could do any work in the area without some Corps involvement as the Corps owns the property on the eastern shore of the lake and has regulatory authority encompassing the lake under Section 10 of the Rivers and Harbor Act of 1899 and Section 404 of the Federal Water Pollution Control Act Amendments of 1972.

ALTERNATIVES TO NECESSARY TASKS

5.04 Earlier in this document (paragraphs 1.09-1.11), it was stated that there were a number of tasks necessary to achieve the project goals. During the planning process, a number of methods were considered to accomplish these tasks. The following is a synopsis of the alternatives considered and why some were discarded, others selected. To reiterate the five necessary tasks, they are:

- a. Alleviation of chronic winterkill problem
- b. Control of rough fish
- c. Provision of recreational facilities
- d. Diversion of the storm sewer
- e. Relocation of the power line

Winterkill Alleviation

5.05 Three potential methods of alleviating Lake Rebecca's winterkill problem were identified: (1) substantially increase the volume of the lake to increase its capacity for storing dissolved oxygen, (2) intro-

SECTION FIVE

ALTERNATIVES

duce Mississippi River waters at the upper end of the lake over the winter to provide flow-through water, and (3) mechanical aeration.

5.06 Increasing the volume of the lake could be done by raising the lake and dredging. The lake can only be raised 2.5 feet without extensive flooding of the island, so this alone would not be the solution.

5.07 Dredging coupled with a lake raise could substantially increase the volume of the lake, as shown below.

| | Volume ¹ (acre-feet) | Ave Depth ¹ (feet) | Max Depth ² (feet) |
|---|------------------------------------|----------------------------------|----------------------------------|
| Existing Condition (elevation 677.5) | 213 | 5.75 | 9.5 |
| Lake Raise to Elevation 680.0 | 305 | 8.25 | 12.0 |
| Lake Raise and Dredging | | | |
| 50,000 cy | 336 | 9.10 | 13.7 |
| 100,000 cy | 367 | 9.95 | 15.3 |
| 200,000 cy | 429 | 11.60 | 18.7 |
| 300,000 cy ³ | 491 | 13.30 | 22.0 |

¹ Volume and ave depth figured for present lake area only

² Max depth over about $\frac{1}{2}$ of the lake area

³ Maximum volume that could be practicably dredged because of long narrow shape of the lake.

5.08 Minnesota DNR fisheries personnel do not believe that even the maximum increase in lake volume would alleviate the winterkill problem. This, coupled with other problems with dredging as outlined in paragraphs 5.29-5.36 eliminated the dredging alternative from consideration.

5.09 Water could be allowed through the dike via culverts from Pool 2 of the Mississippi to add oxygenated water into the lake in the winter. This plan was removed from consideration as it would be nearly impossible to effectively control rough fish entry into the lake from Pool 2 and the plan would allow lower-quality water (nutrients, sediment loading, etc.) to enter the lake.

5.10 The process of elimination left mechanical aeration as the most viable solution. The "Helixor" system was selected as it has been shown to be effective on other winterkill lakes in Wisconsin and Minnesota.

Control of Rough Fish

5.11 Control of rough fish entry into the lake is fairly straightforward, as the only source of direct access (other than stocking by man or birds) is from the Mississippi River. Thus the control structure was placed near the access point; i.e., where the lake outlets to the Mississippi River.

5.12 Eradication of the rough fish in the lake is also necessary. Two potential methods were considered: draining the lake, and eradication with a toxicant. The lake will not drain as the bottom of the lake is well below the elevation of the outlet. Pumping would lower the lake but not completely empty it. Pumping could not keep ahead of groundwater and seepage input once the lake was near empty, primarily because of the reversal of hydraulic head with the Mississippi River below L/D 2 once the lake dropped below 675.0 and the ever-increasing hydraulic head differential with Pool 2. Thus, use of toxicant is deemed to be the only viable alternative.

Provision of Recreational Facilities

5.13 It is the position of the St. Paul District that any restoration of the fishery in Lake Rebecca must be accompanied by some recreational development to provide the public better access to and ability to use the lake. Without this, the primary benefactors of any fishery restoration efforts would be the private landowners on the west side of the lake and not the general public.

5.14 The basic tenet during the planning of the recreational facilities was to provide the public the ability to enjoy Lake Rebecca with the minimal amount of disturbance to the natural setting of the area.

5.15 The area has the capacity for additional facilities such as softball fields, snowmobile trails, trailer-in boat launches, etc. However, these types of facilities were eliminated during the planning phase on the basis that associated with them would be environmental disturbances and alterations not consistent with the basic planning tenet.

Storm Sewer Diversion

5.16 An alternative method of diverting the storm sewer from Lake Rebecca would be to continue it on in an 84-inch concrete pipe directly to the Mississippi River. This was the plan proposed in the draft EIS. It is advantageous over the proposed plan in that it would eliminate the need for the dike and allow Lake Rebecca to be about 5 acres larger at elevation 680.0. It also would provide for more positive rough fish control by eliminating the area between the dike and the road from which people could transfer rough fish into Lake Rebecca.

5.17 During subsurface investigations it was discovered that due to substrate conditions along the base of the bluff where the 84-inch concrete sewer extension was proposed to go, the costs of this alternative would be much greater than originally believed (about \$840,000). For this reason, the more economical dike alternative (about \$670,000) was chosen even though it is not as desirable as diverting the storm sewer with a buried concrete pipe.

Power Line Relocation

5.18 The relocated power line could take various different routes. The selected route is the most economical in that it ties into the existing line on the bluff side of the lake and runs along the road and the tank farm to minimize clearing expense and environmental disruption.

ADDITIONAL ALTERNATIVE FEATURES

5.19 The following is a discussion of additional alternatives to certain aspects of the proposed action. Selection of these alternatives would not significantly affect the chances of achieving project goals.

Lake Raise

5.20 Some raise in lake levels is considered necessary to provide the vertical drop in the outlet structure to control rough fish. The proposed project raises the lake to 680.0, which provides 5 feet of vertical drop to control rough fish. A raise over 680.0 is not considered viable as extensive flooding of the island would occur.

5.21 A lesser lake raise to only 679.0 is a viable alternative. This alternative would give four feet of vertical drop in the control structure. This also would be sufficient to control rough fish. However, the safety margin against a sudden one- or two-foot fluctuation in the Mississippi River would be reduced.

5.22* With a lake raise to 679.0, approximately 11.5 acres (4 acres of forest and 7.5 acres of marshes) would be flooded on the upper end of the lake, as opposed to 22 acres (13 forest and 9 marsh) for the proposed raise. Due to the proposed bottom shaping, 9 acres would still become lake on the lower end.

5.23 Average lake depth would be less than with the proposed plan, which could add to any vascular aquatic plant growth problems that may occur in the lake.

5.24 The proposed raise to 680.0 opts for the added safety factor in rough fish control and added lake depth versus the flooding of less forested acreage with a raise to 679.0.

Vegetation Clearing

5.25 The proposed plan would leave the vegetation to be flooded at the upper east end for a period of 2-3 years. At that time the decision would be made as to how many, if any, of the trees that would die off are to be removed.

5.26 The alternative exists of clearing this area before flooding. An advantage is that there would not be a large number of dead trees present in a few years which some people would find aesthetically displeasing.

5.27 The disadvantage of this alternative is that predicting which trees would die in this relatively flat area would be difficult. Thus, some trees above 680.0 that would not die may be removed and some that would die may be missed. In a few years there should be a clear distinction between the trees that would die and those that would not.

5.28 Another disadvantage of clearing now is that it would preclude the possibility of allowing some flooded trees to remain for wildlife purposes.

Dredging

5.29 For some time, dredging was considered a possible alternative for the prevention of winterkill, so it received detailed investigation. It was discovered to be economically unviable, environmentally controversial, and was considered nonpreventive of winterkill by the Minnesota DNR. At the present it is considered a non-viable alternative. However, a discussion is provided here as background information.

5.30 Dredging was initially considered a solution to both winterkill and potential vascular aquatic plant growth problems. It still is considered a solution to the latter.

5.31 The major problem with dredging in Lake Rebecca lies with disposal of the material. Trucking the material away could only take place after dewatering of the silty-clay sediments. This would require a diked-disposal area on the island for dewatering, which would take 2-3 years. Also, the material was found to be non-suitable to construction, so none of it could be used as fill in the area to be recreationally developed.

5.32 Next, open-water disposal was considered. As the lake sediments are polluted, they would have to be diked. Diking areas in the upper end of the lake were considered. The diked area could be filled to about 679.5. When the lake was raised to 680.0, these areas would become wetland in nature. The planting of wetland species would speed up the process.

5.33 The major problem with this solution is the loss of lake area, which is inconsistent with the project purpose of rehabilitating the lake. Another problem is a lack of capacity. Dredging and disposing of 40,000 cubic yards (cy) via this method would fill about one-fourth of the lake.

5.34 Next, disposal in Pool 2 of the Mississippi River was considered. Dredging 200,000 cy from the lake would require a 25-acre diked disposal area in Pool 2. As with in-lake disposal, a wetland would be created on the disposal area with the above-water portions of the dikes removed once the wetland vegetation became thoroughly established on the disposal area.

5.35 This alternative involved substantial environmental trade-offs, the primary disadvantages being the loss of 25 acres of open water in Pool 2 and the environmental disturbance of a dredging and disposal operation versus the gain of 25 acres of wetlands and improved habitat in Lake Rebecca.

5.36 This alternative was found to be economically unviable. In addition, the Minnesota Pollution Control Agency stated they would oppose any open-water disposition proposal. This alternative would have undoubtedly raised substantial controversy if it had become the proposed plan.

6.00 ECONOMIC ANALYSIS AND JUSTIFICATION

6.01 Construction Cost Estimates, Allocation and Apportionment - The city of Hastings, by participating with the Corps of Engineers in the development of this project, is eligible to receive Federal funds for certain aspects of this project. Generally, costs for recreation development would be shared equally (50-50). The city and the Federal Government would each assume 50 percent of the construction costs. For fishery enhancement features, costs are generally shared on a 75-25 basis. Here, the city would assume 25 percent of the construction costs. In both cases, the city must agree to operate, maintain, and replace the constructed facilities. In addition, the Federal Government has no general authority to acquire additional lands, easements, or rights-of-way at existing water resource projects. Consequently, the non-Federal sponsor (the city of Hastings) must provide all additional easements required to develop the project and no credit is included in the cost-sharing calculation.

6.02 Table 6 illustrates the construction costs, cost allocation and cost apportionment of each project item. Project items which positively affect the production of the sport fish and wildlife resources are allocated 100 percent fish and wildlife enhancement (cost shared 75-25). In addition to project items for recreation development (picnic tables, grills, beach, restrooms, etc.), those items that promote the utilization of fish and wildlife resources (canoe/boat ramps, parking, fishing piers, etc.) are allocated 100 percent recreation (cost shared 50-50).

6.03 The following features, which include the designated items in the cost table, are allocated 100 percent fish and wildlife enhancement (cost shared 75-25).

Dike/Control Structure - The removal of rough fish and the establishment of a sport fishery is the primary objective; therefore, the proposed dike/control structure has been planned to prevent the reentry of rough fish into the lake. Control of rough fish would also enhance waterfowl production by allowing aquatic macrophytes (an important waterfowl food source) to recolonize the lake. Also, the increase in persistent emergent aquatic vegetation around some of the shoreline areas would provide an additional food source for muskrats, which are present in the area. The dike/control structure would also prevent Mississippi River water and nearby storm sewer effluent from entering the lake. While Lake Rebecca is a nutrient-rich lake, cutting off nutrient inputs from surface flows could result in some flushing of nutrients from the lake by ground-

water inflows. The continued addition of nutrients to the lake from the Mississippi River and the urban storm sewer in the absence of a dike/control structure would encourage the prolific growth of aquatic macrophytes and algae which, after a certain point, would be detrimental to sport fishery production. At this location, Mississippi River waters and the city storm sewer effluent each carry low levels of other pollutants such as heavy metals, phenols, herbicides, and pesticides. While these pollutants are not normally found at levels directly toxic to aquatic organisms, they may have chronic effects that reduce the lake's overall biological productivity which in turn is most often reflected by lower sport fishery production.

Aeration - A bubbler system to provide aeration is proposed to insure that the sport fishery can survive over winter. Aerators will be installed at several locations to keep dissolved oxygen at levels sufficient for sport fish to survive. Regardless of other developments, without aeration the sport fishery will suffer because the lake has a history of frequent winterkilling in early January.

Bottom Shaping - Restructuring the bottom in certain areas to improve fish habitat and lake depths is proposed. This action would have direct enhancement benefits through increased in-lake habitat diversity and productivity. Without deepening, some areas would be shallow and unsuitable for fishlife, especially during the warm summer months. The contouring of the bottom (as proposed) would provide more diverse habitat and more niches for aquatic organisms, including sport fish, than would exist if the area were merely excavated with straight sloping sides and a flat bottom.

Electrical System - The construction cost of the electrical system is allocated 50 percent recreation development and 50 percent fish and wildlife enhancement because the system will be used for both the security lighting and the motor and air compressor for the aerators. All other items are allocated 100 percent recreation development.

Table 6: Construction
Costs, Cost Allocation
and Cost Apportionment

| ITEM | COST | | | COST ALLOCATION | | | | | COST APPORTIONMENT | | | | | |
|--------------------------|----------------|-----------|--------------------|--------------------------|----------------------------------|---------------------------------|--|---|---|------------------------------|---|---|-----------------------|-----------------------|
| | UNITS | UNIT COST | TOTAL COST (A x B) | 1 RECREATION DEVELOPMENT | 2 RECREATION DEVELOPMENT (C x D) | 3 FISH AND WILDLIFE ENHANCEMENT | 4 COST FISH AND WILDLIFE ENHANCEMENT (C x E) | 5 50% FEDERAL RETENTION DEVELOPMENT (E x .50) | 6 75% FEDERAL FISH AND WILDLIFE ENHANCEMENT (F x .75) | 7 TOTAL FEDERAL COST (H + I) | 8 50% FEDERAL RETENTION DEVELOPMENT (I x .50) | 9 75% FEDERAL FISH AND WILDLIFE ENHANCEMENT (J x .75) | 10 TOTAL COST (K + L) | 11 TOTAL COST (M + N) |
| | | | | | | | | | | | | | | |
| Aerators | Job | sum | 5,000 | 0 | 0 | 100 | 5,000 | 0 | 3,800 | 3,800 | 0 | 1,200 | 1,200 | 1,200 |
| Reinforced Concrete Pipe | 150 LF | 80.00/LF | 12,000 | 0 | 0 | 100 | 12,000 | 0 | 9,000 | 9,000 | 0 | 3,000 | 3,000 | 3,000 |
| Control structure | Job | sum | 28,000 | 0 | 0 | 100 | 28,000 | 0 | 21,000 | 21,000 | 0 | 7,000 | 7,000 | 7,000 |
| Energy dissipator | Job | sum | 88,000 | 0 | 0 | 100 | 88,000 | 0 | 66,000 | 66,000 | 0 | 22,000 | 22,000 | 22,000 |
| Grouted Riprap | 170 30.00/CY | 5,100 | 5,100 | 0 | 0 | 100 | 5,100 | 0 | 3,800 | 3,800 | 0 | 1,300 | 1,300 | 1,300 |
| Riprap | 840 22.00/CY | 18,500 | 18,500 | 0 | 0 | 100 | 18,500 | 0 | 13,900 | 13,900 | 0 | 4,600 | 4,600 | 4,600 |
| Levee Fill | 31,000 2.00/CY | 62,000 | 62,000 | 0 | 0 | 100 | 62,000 | 0 | 46,500 | 46,500 | 0 | 15,500 | 15,500 | 15,500 |
| Channel Shaping | 500 3.00/CY | 1,500 | 1,500 | 0 | 0 | 100 | 1,500 | 0 | 1,100 | 1,100 | 0 | 400 | 400 | 400 |
| Bedding | 475 12.00/CY | 5,700 | 5,700 | 0 | 0 | 100 | 5,700 | 0 | 4,300 | 4,300 | 0 | 1,400 | 1,400 | 1,400 |
| Stripping | 2,000 2.00/CY | 4,000 | 4,000 | 0 | 0 | 100 | 4,000 | 0 | 3,000 | 3,000 | 0 | 1,000 | 1,000 | 1,000 |
| Excavation Shaping | 69,000 1.50/CY | 103,500 | 103,500 | 0 | 0 | 100 | 103,500 | 0 | 77,600 | 77,600 | 0 | 25,900 | 25,900 | 25,900 |
| Electrical | Job | sum | 3,000 | 50 | 1,500 | 50 | 1,500 | 750 | 1,150 | 1,900 | 750 | 350 | 350 | 1,100 |
| Powerline Relocation | Job | sum | 100,000 | 100 | 100,000 | 0 | 0 | 50,000 | 0 | 50,000 | 50,000 | 0 | 50,000 | 50,000 |

TABLE 6 (cont.)

| ITEM | COST | | COST ALLOCATION | | | | COST APPROPRIATION | | | | | |
|---------------------------------|--------|-----------------|-------------------------|---|---|---|---|---|---|---|---|---|
| | UNITS | UNIT COST | 2 ALLOCATION (A x B) | 2 FISH AND WILDLIFE ENVIRONMENT (C x D) | 2 FISH AND WILDLIFE ENVIRONMENT (C x E) | 502 FEDERAL ALLOCATION ENVIRONMENT (C x F) | 752 FEDERAL FISH AND WILDLIFE ENVIRONMENT (C x .50) | 752 FEDERAL FISH AND WILDLIFE ENVIRONMENT (C x .50) | TOTAL FISH AND WILDLIFE ENVIRONMENT (C x .50) | TOTAL FISH AND WILDLIFE ENVIRONMENT (C x .50) | 502 FEDERAL ALLOCATION ENVIRONMENT (C x F) | TOTAL FISH AND WILDLIFE ENVIRONMENT (C x .50) |
| Fill | 75,000 | .90/CY | 67,500 | 0 | 0 | 0 | 33,750 | 0 | 33,750 | 33,750 | 0 | 33,750 |
| Sand Fill | 1,400 | 3.00/CY | 4,200 | 0 | 0 | 0 | 2,100 | 0 | 2,100 | 2,100 | 0 | 2,100 |
| Topsoil | 2,700 | 3.00/CY | 8,100 | 0 | 0 | 0 | 4,050 | 0 | 4,050 | 4,050 | 0 | 4,050 |
| Seeding | 5.1 | 700.00/ acre | 3,570 | 0 | 0 | 0 | 1,785 | 0 | 1,785 | 1,785 | 0 | 1,785 |
| Planting | job | sum | 8,000 | 0 | 0 | 0 | 4,000 | 0 | 4,000 | 4,000 | 0 | 4,000 |
| Bridge | job | sum | 8,000 | 0 | 0 | 0 | 4,000 | 0 | 4,000 | 4,000 | 0 | 4,000 |
| Signs | job | sum | 1,500 | 0 | 0 | 0 | 750 | 0 | 750 | 750 | 0 | 750 |
| Nature Trail 4' | 3,000 | .80/LF | 2,400 | 0 | 0 | 0 | 1,200 | 0 | 1,200 | 1,200 | 0 | 1,200 |
| Major Hiking Trail | 4,500 | 4.00/LF | 18,000 | 0 | 0 | 0 | 9,000 | 0 | 9,000 | 9,000 | 0 | 9,000 |
| Beach Changehouse/ restrooms | 1 | 32,000 | 32,000 | 0 | 0 | 0 | 16,000 | 0 | 16,000 | 16,000 | 0 | 16,000 |
| Restroom | 1 | 19,000 | 19,000 | 0 | 0 | 0 | 9,500 | 0 | 9,500 | 9,500 | 0 | 9,500 |
| Casoe Launch | job | sum | 2,800 | 0 | 0 | 0 | 1,400 | 0 | 1,400 | 1,400 | 0 | 1,400 |
| Gravel Roadway | 1900 | 1.80/ey | 3,420 | 0 | 0 | 0 | 1,710 | 0 | 1,710 | 1,710 | 0 | 1,710 |

Table 6 (cont.)

| ITEM | COST | | | COST ALLOCATION | | | | COST APPROPRIATION | | | | | | |
|---------------------|--------|-----------|--------------------|--------------------------|-------------------------|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|--|
| | UNIT | UNIT COST | TOTAL COST (A x B) | 1 RECREATION DEVELOPMENT | 2 RECREATION FACILITIES | 3 FISH AND WILDLIFE ENHANCEMENT | 4 FISH AND WILDLIFE EQUIPMENT (C x D) | 5 FISH AND WILDLIFE EQUIPMENT (C x E) | 6 FISH AND WILDLIFE EQUIPMENT (C x F) | 7 FISH AND WILDLIFE EQUIPMENT (C x G) | 8 FISH AND WILDLIFE EQUIPMENT (C x H) | 9 FISH AND WILDLIFE EQUIPMENT (C x I) | 10 FISH AND WILDLIFE EQUIPMENT (C x J) | 11 FISH AND WILDLIFE EQUIPMENT (C x K) |
| | | | | | | | | | | | | | | |
| Gravel Parking Lots | 6,400 | 1.80/sy | 11,500 | 100 | | | 11,500 | 0 | | | 5,750 | 0 | 5,750 | 5,750 |
| Asphalt sidewalk | 670 | 1.50/sy | 2,400 | 100 | | | 2,400 | 0 | | | 1,200 | 0 | 1,200 | 1,200 |
| Asphalt entrance | 550 | 4.00/sy | 2,200 | 100 | | | 2,200 | 0 | | | 1,100 | 0 | 1,100 | 1,100 |
| Beach (sand) | 10,000 | .85/sy | 8,500 | 100 | | | 8,500 | 0 | | | 4,250 | 0 | 4,250 | 4,250 |
| Woodchip trail | 400 | 5.00/sy | 2,000 | 100 | | | 2,000 | 0 | | | 1,000 | 0 | 1,000 | 1,000 |
| Lighting (security) | 2 | 500 | 1,000 | 100 | | | 1,000 | 0 | | | 500 | 0 | 500 | 500 |
| Control gate & sign | job | sum | 1,500 | 100 | | | 1,500 | 0 | | | 750 | 0 | 750 | 750 |
| Water supply | 1,200 | 12.00/LF | 14,400 | 100 | | | 14,400 | 0 | | | 7,200 | 0 | 7,200 | 7,200 |
| Picnic tables | 35 | 175.00 | 6,100 | 100 | | | 6,100 | 0 | | | 3,050 | 0 | 3,050 | 3,050 |
| Grills | 25 | 85.00 | 2,100 | 100 | | | 2,100 | 0 | | | 1,050 | 0 | 1,050 | 1,050 |
| Trash receptacles | 20 | 50.00 | 1,000 | 100 | | | 1,000 | 0 | | | 500 | 0 | 500 | 500 |
| Water fountains | 3 | 350.00 | 1,100 | 100 | | | 1,100 | 0 | | | 550 | 0 | 550 | 550 |

TABLE 6 (cont.)

| ITEM | COST | | | COST ALLOCATION | | | | COST APPROPRIATION | | | | | |
|---|------|---|---------|-----------------|---|---|---|---|--|--|--------------------------------|--|---|
| | A | B | C | 1 | 2 | 3 | 4 | 501 FISH AND WILDLIFE ENHANCEMENT (C x F) | 502 FEDERAL RECREATION DEVELOPMENT (E x .50) | 503 FISCAL FISH AND WILDLIFE ENHANCEMENT (F x .75) | 504 TOTAL FEDERAL COST (H x 1) | 505 NON-FEDERAL RECREATION DEVELOPMENT (I x .50) | 506 NON-FEDERAL FISH AND WILDLIFE ENHANCEMENT (J x .25) |
| CONSTRUCTION COST | | | 668,700 | 333,900 | | | | 334,800 | | | 418,100 | | 250,600 |
| Subtotal with 15% Contingency | | | 769,000 | 384,000 | | | | 385,000 | | | 480,800 | | 288,200 |
| Engineering & Design 10% | | | 76,900 | 38,400 | | | | 38,500 | | | 48,100 | | 28,800 |
| Supervision, Administration and Inspection 4.5% | | | 34,600 | 17,300 | | | | 17,300 | | | 21,600 | | 13,000 |
| Overhead | | | 11,700 | 5,800 | | | | 5,900 | | | 7,300 | | 4,400 |
| SUBTOTAL | | | 892,200 | 445,500 | | | | 446,700 | | | 557,800 | | 334,400 |
| Real Estate 1 | | | 13,200 | | | | | | | | | | 13,200 |
| Fish Eradication & Restocking 2 | | | 3,300 | | | | | | | | | | 3,300 |
| TOTAL PROJECT COST | | | 908,700 | | | | | | | | 557,800 | | 350,900 |

1 Total cost assumed by local sponsor.

2 Minnesota Department of Natural Resources will carry out this portion of the project.

6.04 Cost/Benefit Analysis - The Water Resources Council has established regulations (Principles and Standards - Federal Register, 10 September 1973) which direct the Corps of Engineers to conduct project benefit/cost economic analyses for all water-related projects under consideration. These regulations require that all projects attempt to assure a return on benefits of \$1.00 for every \$1.00 spent on the project.

6.05 Project Costs - The cost side of the ledger for the Lake Rebecca project includes both the first costs or construction costs shown in table 6, and estimated annual costs necessary to operate and maintain project facilities (table 7). See paragraph 10.01 for more detailed information on annual operation, maintenance, and replacement costs.

Table 7

Estimated Annual Operation, Maintenance and Replacement Costs

| <u>Item</u> | <u>Estimated Annual Cost</u> |
|---|------------------------------|
| Recreation Area O&M (.20/recreation day) | 19,000 |
| Aeration Equipment | 1,300 |
| Lake Control Structure | 150 |
| Lake Fish Restocking | 60 |
| Misc. Equipment & Material Replacement | 600 |
| TOTAL | 21,110 |

6.06 Project Benefits - The benefits accruing to the public from construction of the project are figured by estimating the public's "willingness to pay" for the new recreational opportunities that will be provided by the project. Since it is impossible to fully document what the average project user is willing to pay, a hypothetical day-use value is carefully estimated and applied to the annual project visitation projection to determine project benefits. A synopsis of the benefits is presented in table 8.

Table 8
Project Benefits

| | |
|---|------------------------|
| Estimated average annual project visitation ¹ | 90,200 recreation days |
| Day-use value ² | \$1.75 |
| Average Annual Benefits ³ | \$144,400 |

¹ Visitation reflects maximum use capacity of the project to be obtained by the third full year of operation.

² The medium-range day-use value was based on a professional review of project features which included such variables as project access to area population centers, quality of project aesthetic features, combination of opportunities to be provided, and quality of facilities and resources to be developed. See Exhibit 4 for methodology used.

³ Amortized over 50 years (the project's economic life) at 6 3/8 percent interest rate.

6.07 Benefit/Cost Ratio - To compare costs to benefits, all project costs must first be spread over the economic life (50 years) of the project in the same fashion as the benefits. Project construction costs are amortized and added to project annual operation and maintenance (O&M) costs to estimate total project annual costs. The annual project cost is 81,300. Consequently, estimated benefit to cost ratio is as shown in table 9.

Table 9
Project Benefit/Cost Ratio*

| | |
|---------------------|----------------|
| First Cost | 908,700 |
| Amortized | <u>.06679</u> |
| | \$ 60,700 |
| First Cost | 60,700 |
| Annual O&M Cost | <u>21,100</u> |
| Average Annual Cost | 81,800 |
| Benefit/Cost Ratio: | |
| Ave. Annual Benefit | <u>144,400</u> |
| Ave. Annual Cost | 81,800 = 1.77 |
| Benefit/Cost Ratio | 1.77: 1.00 |

* A detailed calculation of fish and wildlife enhancement benefit/
cost ratio is contained in exhibit 5.

7.00 ENVIRONMENTAL EVALUATION

7.01 General - This section presents a synopsis of the environmental evaluation which was conducted for this project. A detailed discussion of the environmental aspects of this project is contained in the environmental impact statement prepared for the Lake Rebecca project.

7.02 Natural Resource Impacts of the Proposed Project - The project would have two phases, each with quite different environmental effects. Most effects during the construction phase would be adverse, mainly because the project site would be disturbed. There would be noise and vehicle emissions, tree removal, and soil movement; i.e., the usual impacts associated with a land-clearing and minor construction project. In addition, the fish population of Lake Rebecca would be eradicated along with the other aquatic biota of the lake such as zooplankton and invertebrates.

7.03 Once completed, the project would provide a substantial increase in available recreational opportunities at Lake Rebecca. The increased usage of the area may cause traffic congestion at one of the arterial street intersections leading to the site.

7.04 Lake Rebecca would be restocked with sport fish and the other aquatic forms would recolonize the lake. The lake would support a northern pike-large-mouth bass-sunfish-catfish fishery.

7.05 There would be a loss of terrestrial habitat due to recreation development and flooding. This would be offset by an increase in aquatic and wetland habitat. Aquatic plant growth in the lake may reach nuisance levels requiring cosmetic maintenance of high-use areas such as the boat launch and beach areas.

7.06 Human use in the area would have little effect on the biological productivity of the site. There would be the commitment of some irretrievable resources in the form of fuels, electricity, building materials and human labor. The resource base would not be irretrievably committed to recreational usage, as the area could be restored to near present conditions with little expenditure of labor and money if this course of action is decided on in the future.

7.07 The project is consistent with local land use plans and is not anticipated to have impact upon future land use patterns in Hastings.

7.08 Social Impacts of the Proposed Action - Regulation of recreation use in the project area, by adoption and enforcement of park ordinances, will be the responsibility of the local sponsor. The development and extension of local jurisdiction may alleviate current problems of nuisance behaviors in the area, which have been a source of irritation to adjoining landowners and the Lakeside Cemetery Association. Nuisance behaviors in the area have included minibiking, snowmobiling, liquor use and trespassing, leading to vandalism in adjoining areas. The Lakeside Cemetery Association in particular has expressed concern that increased public use of the lake area will contribute to current vandalism problems. The Association has suggested that extensive fencing may be necessary to avoid this consequence.

7.09 To protect the entire length of the west bank of the lake along the private property would require approximately 7,200 linear feet of fence. The cost would vary significantly with the type and height of fence to be used, as listed below.

| <u>Type</u> | <u>Height</u> | <u>Cost</u> |
|-----------------|---------------|-------------|
| Chain link | 6 feet | \$60,500 |
| | 4 feet | 46,800 |
| Woven wire with | 6 feet | 14,400 |
| 4 x 4 posts | 4 feet | 12,600 |

Some clearing of vegetation would be necessary. Another question is the appropriateness of a fence on some of the very steep slopes which occur on this side of the lake.

7.10 At this time, it is the opinion of the Corps of Engineers that signing the private property and adopting and enforcing park ordinances would deter nuisance behaviors. The signs would be in keeping with the surroundings, easily read, strategically placed to be visible, and would contain a message that the property is private and no public access or use is permitted. Park ordinances would restrict night access and use as well as providing police patrol.

7.11 The noise level in the project area should be generally reduced, especially during late hours, when high noise levels cause maximum irritation. One of the major reductions of noise will result from the exclusion of all motorized vehicles (other than automobile access to the parking area). No restriction on such vehicles presently exists. The second source of noise reduction will be the elimination of present late hours irritation, from both vehicles and beach parties, by closing of the park at 10 pm. The only source of noise which will be created by the project is the swimming beach which, by customary usage, should be confined to daylight hours. This area will be at the opposite side of the lake from residential settlement.

7.12 A minor increase in short-term noise levels will result from the construction of the project. The increase in noise will be confined to day-time hours, and will conclude with the completion of the project.

7.13 The visual quality of the area will be enhanced and preserved by the design and maintenance of the project. First, the water surface area and clarity of the lake will be increased (due to a raise in the lake level and elimination of rough fish). Second, the regular collection of litter and refuse will be assured as a permanent maintenance function not presently provided. Third, the designation of adjacent private properties as a scenic zone will insure control to maintain the natural integrity of the area. Fourth, the elimination of combustion engine noise will provide a condition of environment necessary to most people for relaxed visual appreciation.

8.00 COORDINATION WITH OTHERS

8.01 The Corps has worked closely with the local sponsor (the city of Hastings) and the Lake Rebecca Task Force during the formulation of the proposed project.

8.02 Public and Interagency Meetings - On 10 September 1976, a meeting was held in Hastings with the public and interested agencies to provide background information and to inform everyone on the data collection process. On 6 October 1976, an interagency coordination meeting was held at the St. Paul District Office to solicit the views of, and discuss the project with, Federal and State agencies most directly involved with the project, either as participants or in a review capacity. The meeting was attended by the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Corps of Engineers. On 9 December 1976 and 5 May 1977, public information meetings were held in Hastings to inform the public and interested agencies on the progress made in developing a plan. A public hearing was held 23 August 1977 in Hastings to solicit public input on the proposed project.

8.03 The Minnesota Department of Natural Resources has provided valuable input during the development of the proposed plan. In addition, they have indicated a willingness to eradicate the rough fish in Lake Rebecca and to restock the lake with sport fish.

8.04 Federal, State and Local Agencies - The Federal, State and local agencies listed below will be provided a copy of the development plan for their review and comment.

Federal Agencies:

- Fish and Wildlife Service*
- Bureau of Outdoor Recreation
- Environmental Protection Agency
- Public Health Service

State Agencies:

- Department of Natural Resources
- State Historical Society
- State Archaeologist
- State Pollution Control Agency

Local:

- Lake Rebecca Task Force
- City of Hastings, Minnesota

* The comments of the Fish and Wildlife Service on the Draft Plan for Development are incorporated in the letter of comment from the U.S. Department of the Interior, which is included in the Final Environmental Impact Statement.

9.00 PLAN IMPLEMENTATION

9.01 Development Priorities - In this section several assumptions are made. They are: a) the plan of development is approved by July 1978 b) the cost sharing contract is signed in August 1978 c) the lease agreement is approved in August 1978 and d) the necessary Federal and non-Federal funds are available. If all of the above conditions are met, the schedule of the design and construction of the project would be as shown in figure 8.

9.02 Project Funding - It is estimated that the non-Federal portion of the project would cost \$350,900. The local sponsor (city of Hastings) would obtain this amount from various sources, such as a bond issue, grants from State agencies, donations from local businesses and potential user fees. In order for the Minnesota DNR to become involved in the fishery enhancement of the lake, free access must be given to the lake. However, a fee can be charged to users of the other recreation facilities constructed in cooperation with the Corps.

9.03 The estimated cost of the Federal portion of the project is \$557,800.00. Funds to initiate construction of recreational facilities for the Lake Rebecca project were appropriated in fiscal year 1978 under the Code 710 Program (Recreation Development at Completed Projects). Additional funds would be required in subsequent fiscal years to complete the planned development.

9.04 Non-Federal Responsibilities - To implement the plan for development, the city of Hastings would acquire 23 acres in flowage easement, and prepare scenic zoning regulations for 40 acres (plate 2). In addition, approximately 120 acres of federally-owned lands would be leased to the city of Hastings. The lease agreement would require that the city manage the lands in accordance with the plan for development.

9.05 Cost Sharing Contract - By signing the cost sharing contract, the city of Hastings would accept responsibility for the non-Federal portion of project costs and would agree to operate, maintain, and replace the constructed facilities.

FIGURE 9:
PROPOSED SCHEDULE OF DESIGN AND CONSTRUCTION

| ITEM | 1978 | | | | | | | | | | | | 1979 | | | |
|--|------|---|---|---|---|---|---|---|---|---|---|---|------|---|--|--|
| | A | S | O | N | D | J | F | M | A | M | J | J | A | S | | |
| SIGNING OF COST-SHARING CONTRACT | | | | | | | | | | | | | | | | |
| PROJECT DESIGN AND SPECIFICATIONS | | | | | | | | | | | | | | | | |
| VEGETATIVE CLEARING | | | | | | | | | | | | | | | | |
| POWERLINE RELOCATION | | | | | | | | | | | | | | | | |
| CONSTRUCTION OF CONTROL STRUCTURE | | | | | | | | | | | | | | | | |
| BOTTOM SHAPING | | | | | | | | | | | | | | | | |
| DIKE CONSTRUCTION | | | | | | | | | | | | | | | | |
| TRAIL CONSTRUCTION | | | | | | | | | | | | | | | | |
| CONSTRUCTION & INSTALLATION OF AREATION FACILITIES | | | | | | | | | | | | | | | | |
| CONSTRUCTION OF ROADS & PARKING AREA | | | | | | | | | | | | | | | | |
| UTILITIES | | | | | | | | | | | | | | | | |
| RECREATION FACILITIES | | | | | | | | | | | | | | | | |
| LAKE LOWERING & FISH ERADICATION | | | | | | | | | | | | | | | | |
| LAKE REFILLING & RESTOCKING * | | | | | | | | | | | | | | | | |

*Additional stocking will occur as needed.

SECTION TEN

ADMINISTRATION AND MANAGEMENT

10.00 ADMINISTRATION AND MANAGEMENT

10.01 Responsibilities - The principal responsibility of the city of Hastings will be the operation, maintenance and replacement of constructed facilities. In addition, the lease agreement provides for protection of the existing natural character and visual quality of the project area.

10.02 In table 10 below, the costs presented in table 7 (Estimated Annual Operation, Maintenance and Replacement Costs) are described in terms of the staff and equipment needed.

Table 10
Annual Operation and Maintenance for Recreation

Area

| | |
|---|---------|
| Lifeguards at \$4.00/hr. | \$6,700 |
| - 2 lifeguards 40 hrs/week, 14 weeks/season | |
| - 2 lifeguards 20 hrs/week, 14 weeks/season | |
| Maintenance Supervisor at \$5.50/hr. | 4,400 |
| - 1 maintenance supervisor 40 hrs/week, 20 weeks/season | |
| Maintenance Workers at \$4.30/hr. | 3,400 |
| - 2 maintenance workers 20 hrs/week, 20 weeks/season | |
| LABOR SUBTOTAL* | 14,500 |
| O&M on Pickup Truck | 500 |
| Sanitary Pumping | 2,000 |
| Trash collection | 2,000 |
| SUBTOTAL | 19,000 |

* Does not include overhead - assumes city of Hastings will absorb cost into present overhead.

Aeration Equipment - 4 units operating 1 December to 15 March (3 1/2 months)

| | |
|--|-------|
| Equipment | |
| - Electricity \$310/month 3 1/2 months | 1,085 |
| - Oil and filters \$10/month 3 1/2 months | 35 |
| Labor (lubrication, cleaning air filter, changing oil and oil filters) | |
| - 10 hrs/month at \$6.00/hr. 3 1/2 months | 210 |
| SUBTOTAL | 1,300 |

Table 10 (CONT)

Lake Control Structure

Labor (removal and replacement of stop logs and cleaning of fish screen)

SUBTOTAL \$150

Restocking of Fish*

SUBTOTAL 50

* Cost to be assumed by Minnesota Department of Natural Resources

Replacement of Miscellaneous Equipment and Material

Cost to Replace:

| | |
|----------------------------|--------|
| Picnic Tables | 4,400 |
| Grills | 1,700 |
| Trash Containers | 750 |
| Water Fountains | 2,100 |
| Canoe Launch | 2,750 |
| Signs | 1,500 |
| Security Lighting | 1,000 |
| Aerators (compressor only) | 2,000 |
| Control Structures | 24,000 |

Total 40,200

| | |
|----------------------------|--------|
| Cost to Replace: | 40,200 |
| Present Worth ¹ | 0.2133 |
| | 8,575 |

| | |
|------------------------|------------------|
| Amortized ² | 8,575 |
| | .06679 |
| | 575 ³ |

SUBTOTAL 600

TOTAL 21,100

¹

Replacement was assumed to occur at the midpoint of the project life (25 years). Actual replacement would vary with type of equipment and material.

²Amortized over 50 years (the project's economic life) at 6 3/8 percent interest rate.

³Amount to be set aside each year in order to finance replacement at midpoint of project life.

10.03 Fees and Charges - All fees and charges for use of developed areas and facilities will be consistent with the schedule of charges contained in the cost-sharing contract. Under the present cost-sharing regulations, the city of Hastings has the opportunity to charge user fees at the proposed facilities. At this time, the city does not plan to charge any user fee.

10.04 Fire Control - The city of Hastings will provide for adequate fire prevention, and control of the project area and facilities.

10.05 Law Enforcement - A security plan to minimize lawlessness and vandalism will be prepared and implemented by the city of Hastings.

10.06 Forestry Management - The primary forest management objectives at this project are aesthetic enhancement and watershed protection. All open areas to be developed for recreation should be planted at the earliest possible time with tree seedlings of species native to the area. Cutting will be restricted to salvage operations for the removal of dead and diseased trees; however, as the removal of these trees is basically for aesthetic and safety reasons, in cases where they do not constitute safety hazard, they should be left standing to provide den trees for wildlife. All timber lands will be managed with due regard to good forestry practice in harvesting and protection.

10.07 Health, Sanitation and Pollution Control - In promoting the adequate standards relating to health, sanitation and pollution control, all developments for public use will be thoroughly coordinated with the Minnesota Department of Health. It will be the responsibility of the city of Hastings to initiate such coordination for any contemplated development of project lands.

10.08 Fishery Management - A sport fishery would be established at Lake Rebecca in the plan for development. To maintain the fishery, winterkill conditions would have to be alleviated and rough fish entry would have to be controlled. The aeration system in conjunction with the increased volume of the lake would prevent winterkill conditions. The control structure would be a barrier to rough fish entry during normal water levels; but when floods overtop the Lock and Dam road (elevation 691 feet), rough fish would enter Lake Rebecca. After such a flood the rough fish would have to be eradicated and game fish restocked. Past records indicate that this flood condition could be expected every 17 to 20 years.

11.00 CONCLUSIONS AND RECOMMENDATIONS

11.01 Conelusions - Lake Rebecca's location - near the downtown area of Hastings, Minnesota - assures that any recreation developments made at Lake Rebecca will receive moderate visitation at a minimum. Full utilization of this potential recreation resource depends upon two factors: adequate water quality and the ability to maintain a sport fishery. The proposed day-use recreation development would accomodate an annual visitation of 90,200 recreation days. This amount of visitation is expected by 1980.

11.02 Recommendations - It is recommended that this Plan for Development be approved as the basis for development and management of both present and future recreation facilities at Lake Rebecca. It is further recommended that the site plans and utility plans as presented in this report be approved as a basis for development of detailed construction drawings and specifications.

TECHNICAL

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ST. PAUL DISTRICT, CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

X

RESOLUTION NO. 13 - 76

RESOLUTION OF THE CITY COUNCIL OF HASTINGS, MINNESOTA

DECLARING INTENTION OF PART OF CITY OF HASTINGS TO UNITED STATES GOVERNMENT, U.S. ARMY CORPS OF ENGINEERS, CONCERNING LOCAL PARTICIPATION IN RECREATION FEATURES OF PROJECT FOR FISHERY ENHANCEMENT AND RECREATION DEVELOPMENT ON MISSISSIPPI RIVER (LAKE REBECCA), DAKOTA COUNTY, MINNESOTA

WHEREAS, the U.S. Army Corps of Engineers, St. Paul District, has completed a document entitled "Lake Rebecca - Results of Investigation," which indicates existing physical conditions and probable reasons for these conditions; and

WHEREAS, work on Lake Rebecca, to enhance its fish and wildlife value could be authorized by the Federal Water Project Recreation Act of 1965 (Public Law 89-72); and

WHEREAS, under this act, the United States would bear three-fourths of the costs of enhancing Lake Rebecca's fish and wildlife conditions, with such costs being non-reimbursable; and

WHEREAS, in order for any expenditure of public funds to be meaningful and proper, suitable public use development must take place to ensure that the general public will have access to the lake and adjacent public lands; and

WHEREAS, under said act, the United States would bear one-half of the separable costs of recreational facilities and lands, with such costs being non-reimbursable; and

WHEREAS, as a prerequisite to participation by the United States in the recreation aspects of the project under the Federal Water Project Recreation Act of 1965, a responsible local agency must indicate its intent in writing that it will participate in said project to the extent which is hereinafter set forth; and

WHEREAS, it is the desire of this City Council that the City of Hastings supply the necessary local participation in connection with the recreation aspects of the project;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Hastings, State of Minnesota that the City of Hastings hereby indicates and declares its intention as follows in connection with said project:

Exhibit 1

A-1

Resolution No. _____
Cont.

1. It will administer project land and water areas for recreation.
2. It will furnish the non-Federal share of separable recreations costs by payment in cash during the construction period; through provision of land or facilities for the project; by repayment with interest on the unpaid balance at a rate comparable to that for other interest-bearing functions of Federal water resources projects; or by a combination of these, with such costs currently estimated at \$175,000 for fishing enhancement and public use development.
3. It will operate, maintain and make major replacements of the recreation facilities, the amount of the expense being presently estimated at \$7,000 annually for the facilities being provided in the initial project construction.
4. It will enter into a formal contract to operate, maintain, a cost share developed facility assuming that a mutually acceptable plan is developed and approved.

Adopted by the City Council of the City of Hastings, Minnesota this
15th day of March, 1976.

ATTEST:


Mayor

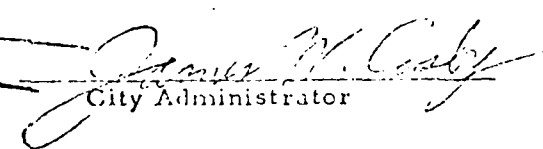

City Administrator

Exhibit 1

A-2

CITY OF HASTINGS

100 SIBLEY STREET, HASTINGS, MINNESOTA 55033

Phone 437-6331 or 437-4127



Hastings on the Mississippi

OFFICE OF

ADMINISTRATOR - CITY CLERK

November 17, 1977

Gentlemen:

The City Council of the City of Hastings, Minnesota met in a regular meeting on Monday, November 7, 1977 at 7:30 P.M. in the Council Chambers of the City Hall.

Members present: Councilmen Shannon, Trautmann, Fischer, Erickson, Latch, Novak, Collins, and Mayor Petersen.

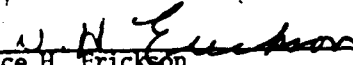
Members absent: Councilman Karnick.

Moved by Councilman Trautmann, seconded by Councilman Shannon to adopt the resolution, as amended, declaring the intent of the City for local participation in recreation and fish and wildlife enhancement features at Lake Rebecca (Mississippi River, Pool 2), Dakota County, Minnesota subject to approval of financing by Referendum and participation by others. Copy of detailed resolution on file in City Clerk's office. Ayes, 7; Nays, none.

CERTIFICATION

I, the undersigned, being the duly qualified and acting Clerk of the City of Hastings, Minnesota, do hereby certify that the foregoing extract of minutes of a meeting of the Council of said City held on the date therein indicated is a full, true and correct transcript thereof insofar as said minutes relate to the foregoing motion.

Witness my hand and the seal of said City this 17th day of November, 1977.


Wallace H. Erickson,
City Clerk/Treasurer

SEAL

Exhibit 2

A-3

RESOLUTION NO. 135-77

RESOLUTION OF THE CITY COUNCIL
OF THE CITY OF HASTINGS
NOVEMBER 7, 1977

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HASTINGS
DECLARING THE INTENTION OF THE CITY FOR LOCAL PARTICI-
PATION IN RECREATION AND FISH AND WILDLIFE ENHANCEMENT
FEATURES AT LAKE REBECCA (MISSISSIPPI RIVER, POOL 2),
DAKOTA COUNTY, MINNESOTA SUBJECT TO APPROVAL OF FINANCING
BY REFERENDUM AND PARTICIPATION BY OTHERS

WHEREAS, the St. Paul District, Corps of Engineers and the City of
Hastings have developed a mutually acceptable draft plan of development for
recreation and fishery enhancement features at Lake Rebecca, and

WHEREAS, the City has read and understands the provisions of the
draft cost-sharing contract; and

WHEREAS, the City intends to provide the non-federal share of project
costs, so long as the same is approved by referendum, and so long as commit-
ments by others to participate in financing are continued; and

WHEREAS, the City has the capability to operate, maintain and replace
constructed facilities; and

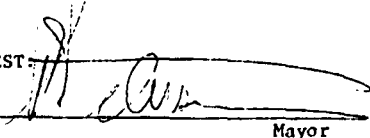
WHEREAS, the proposed developments will have long-term beneficial
effects on the City;

NOW, THEREFORE, be it resolved by the City Council of the City of
Hastings, State of Minnesota, that the City of Hastings hereby declares its
intention as follows:

1. The City intends to act as a non-Federal sponsor and provide funds
as indicated in the cost-sharing contract, the non-Federal share being current-
ly estimated at \$477,100, subject however to approval by referendum of the
portion thereof to be expended by the City of Hastings (approximately \$225,000)
and further subject to participation by the Minnesota Legislative Resources
Commission in the amount of \$200,000 and participation by Northern States
Power Company in the amount of \$34,000 and participation by the State Depart-
ment of Natural Resources in the amount of \$20,000.
2. The City intends to operate and maintain and replace facilities as
required during the life of the project, annual costs being currently estimated
at \$21,100.00.
3. Upon approval of the mutually acceptable plan of development and
at the request of the Secretary of the Army, the City will enter into the formal
contract, it being understood however, that before the City may commit itself
financially that said commitment must be approved by citizens of the City of
Hastings by referendum.

Adopted by the City Council of the City of Hastings, Minnesota, this 7th
day of November, 1977.

ATTEST


Mayor

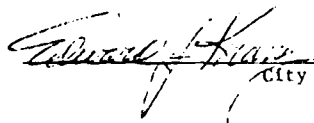

City Administrator

Exhibit 3

CONTROL STRUCTURE SCHEMATIC

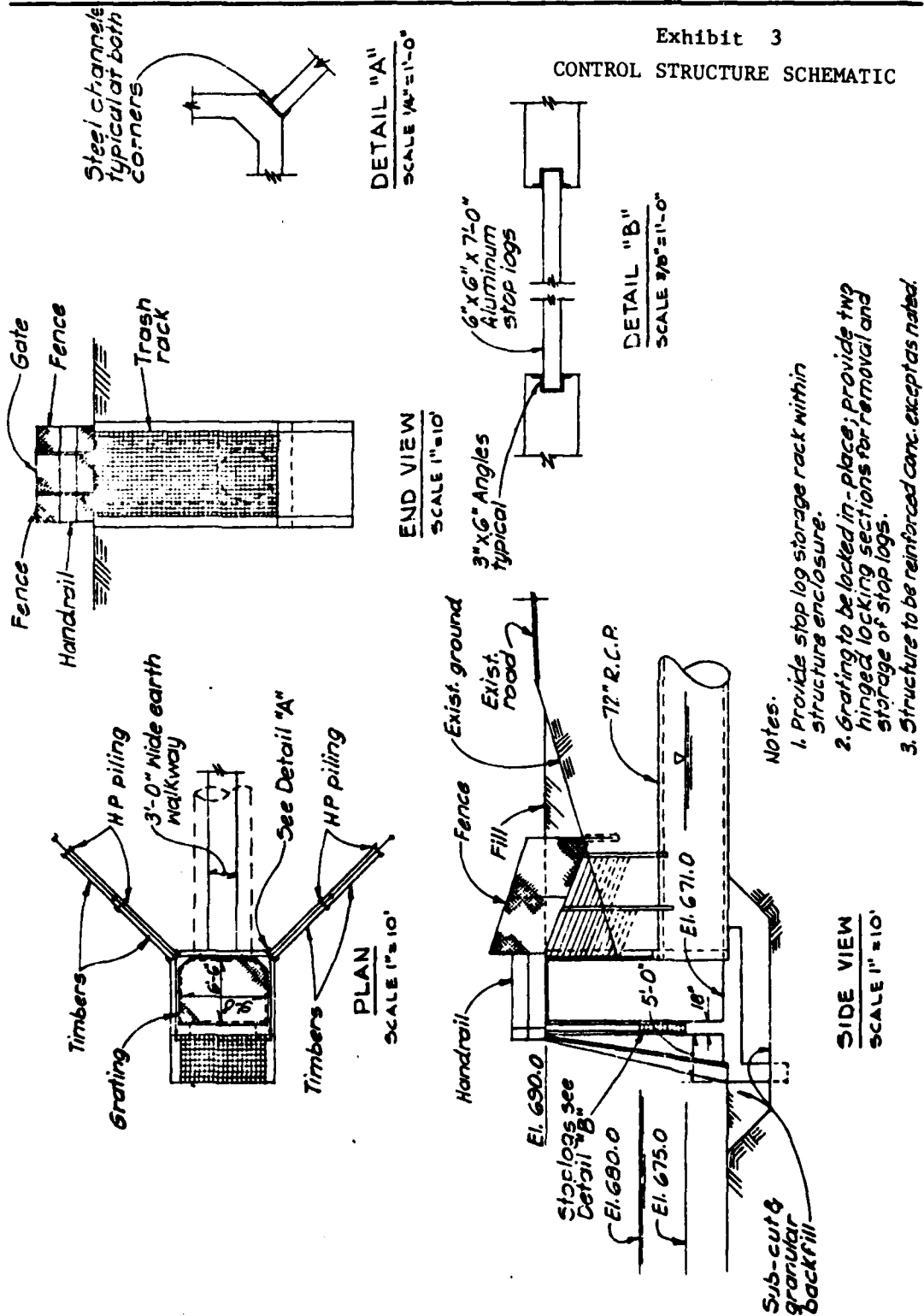


EXHIBIT 4

Unit Value Determination for Recreation at
Non-Reservoir, Urban Area Projects

For each of the five criteria listed below, select a value between 0 and 10. The values are then totaled to determine the overall unit value for the project. Remember, nothing is perfect.

Criterion 1. Quality of Project Access Value 6

To be considered under this criterion are the accessibility of the recreation areas from all points within the market area and the quality of the access roads.

Criterion 2. Quality of Facilities Provided Value 7

Consideration is given to the overall site plan, the architectural appropriateness of the facilities, and level of development in terms of level or intensity of use. Maintenance must also be considered both in terms of planning maintenance programs and future maintenance programs.

Criterion 3. Diversity of Recreational Opportunities Available Value 5

The resource capacity must be considered while attempting to provide the widest range of water-oriented opportunities possible. Also, the facilities to be provided by the non-Federal sponsor and those recreation areas linked to the project are given consideration. Competitive facilities must also be considered.

Criterion 4. Utilization of the Facilities Value 7

Consideration is given to future recreation demands and whether or not the proposed facilities have been planned to accommodate the future demands.

Criterion 5. Aesthetic Conditions Value 8

Given the urban surroundings, this criterion evaluates the setting of areas, determines whether or not the project structures (flood-walls, levees, dams, etc.) are designed to be attractions or distractions, and so on.

EXHIBIT 4
continued

| TOTAL | 1 | 2 | 3 | 4 | 5 | 6-7 | 8-9 | 10 |
|------------|-------|-------|------|-------|-------|------|------|------|
| UNIT VALUE | \$.75 | .80 | .85 | .90 | .95 | .95 | 1.00 | 1.05 |
| | 11-12 | 13-14 | 15 | 16-17 | 18-19 | 20 | | |
| | 1.10 | 1.15 | 1.20 | 1.25 | 1.30 | 1.35 | | |
| | 21-22 | 23-24 | 25 | 26-27 | 28-29 | 30 | | |
| | 1.40 | 1.45 | 1.50 | 1.55 | 1.60 | 1.65 | | |
| | 31-32 | 33-34 | 35 | 36-37 | 38-39 | 40 | | |
| | 1.70 | 1.75 | 1.80 | 1.85 | 1.90 | 1.95 | | |
| | 41-42 | 43-44 | 45 | 46-47 | 48-49 | 50 | | |
| | 2.00 | 2.05 | 2.10 | 2.15 | 2.20 | 2.25 | | |

FISH AND WILDLIFE BENEFIT-COST RATIO

FISH AND WILDLIFE CONSTRUCTION COSTS

| <u>Percent</u> ¹ | <u>Item</u> | <u>Actual Costs</u> |
|-----------------------------|-----------------------------------|---------------------|
| 50 | Electrical | \$1,500 |
| 100 | Aerators | 5,000 |
| 100 | 48" RCP | 12,000 |
| 100 | Control Structure | 28,000 |
| 100 | Energy Dissipator | 88,000 |
| 100 | Grouted Riprap | 5,100 |
| 100 | Riprap | 18,500 |
| 100 | Level Fill | 62,000 |
| 100 | Channel Shaping | 1,500 |
| 100 | Bedding | 5,700 |
| 100 | Stripping | 4,000 |
| 100 | Bottom Shaping | 103,500 |
| | SUBTOTAL | 334,800 |
| | Subtotal with 15% Contingency | 385,000 |
| | Engineering & Design 10% | 38,500 |
| | Supervision & Administration 4.5% | 17,300 |
| | Overhead | 5,900 |
| | TOTAL | 446,700 |

¹Percent of each item allocated to fish and wildlife enhancement - table

ESTIMATED ANNUAL OPERATION, MAINTENANCE AND REPLACEMENT COSTS

| <u>Item</u> | <u>Cost</u> |
|--|-------------|
| Recreation Area Operation and Maintenance (.20/recreation day) | \$4,110 |
| Aeration Equipment | 1,040 |
| Lake Control Structure | 110 |
| Fish Restocking | 50 |
| Misc. Equipment & Material Replacement | 140 |
| TOTAL | \$5,450 |

FISH AND WILDLIFE BENEFIT-COST RATIO

Though not required for purposes of project economic justification, the following information is provided to measure the economic reasonableness of providing fish and wildlife enhancement features.

Based on planners' judgment, benefits to project users contributed toward fish and wildlife enhancement measures were estimated at 1/3 of total project benefits. The estimate was based on both a review of public use opportunities that would be made available, and the expected mix of activities in which the average project user would participate. Main user attraction of the project is the water/forest oriented environment. All recreationists using the project will receive secondary if not primary benefits through improvements to project resources by means of fish and wildlife enhancement measures. Project users will include summer bank and lake hikers, canoeists and wildlife observers. During the school year, several nearby schools have used the park area for outdoor education classes and have indicated that with development of access parking, sanitary and trail facilities, their use of the area would greatly increase. These activities provide opportunities to the public for both consumption of fishery resources and nonconsumptive use of wildlife resources.

FISH AND WILDLIFE BENEFITS

| | |
|--|------------------------|
| *Estimated average annual fishing and wildlife visitation ¹ | 30,000 recreation days |
| Day-Use Value ² | \$1.75 |
| Average Annual Benefits ³ | \$48,100 |

¹Visitation reflects maximum use capacity of the project to be obtained by the third full year of operation.

²The medium-range day-use value was based on a professional review of project features which included such variables as project access to area population centers, quality of project aesthetic features, combination of opportunities to be provided, and quality of facilities and resources to be developed.

³Amortized over 50 years (the project's economic life) at 6 3/8 percent interest rate.

*. The 30,000 recreation days used as the estimated average annual fishing and wildlife visitation are included in the 90,200 recreation days shown in table 5 on page 26.

FISH AND WILDLIFE BENEFIT-COST RATIO

| | |
|----------------------------------|---------------|
| First Cost | \$446,700 |
| Amortized | <u>.06679</u> |
| | \$29,800 |
| First Cost | \$29,800 |
| Annual Operation and Maintenance | <u>5,450</u> |
| | \$35,250 |
| Average Annual Benefit | \$48,100 |
| Average Annual Cost | \$35,250 |
| Benefit Cost Ratio | 1.36 : 1.00 |



Exhibit 6

A-11

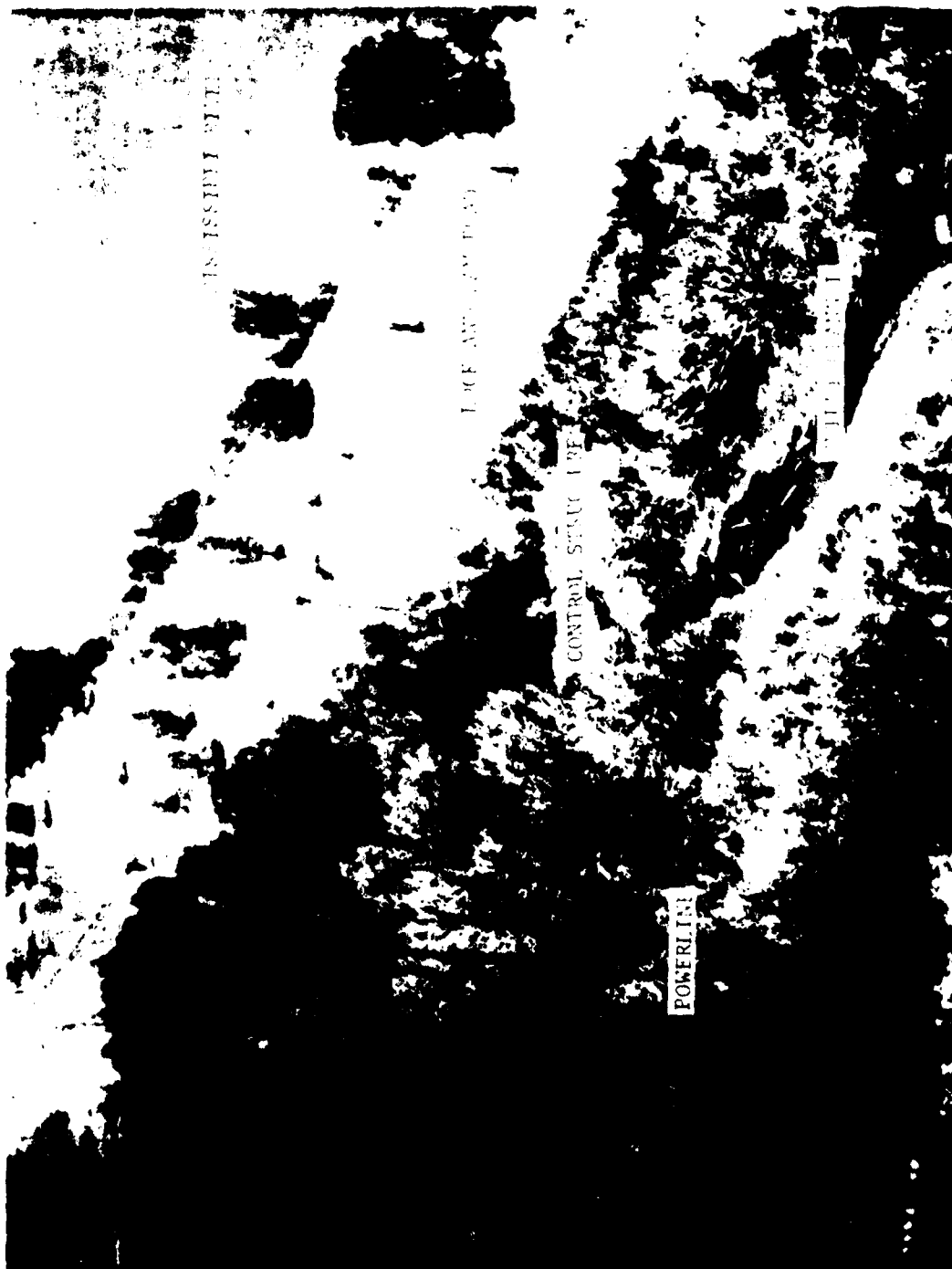


Exhibit 6



Exhibit 6



Exhibit 6



AD-A120 754

MISSISSIPPI RIVER 9-FOOT CHANNEL NAVIGATION POOLS ST
ANTHONY FALLS POOLS A..(U) CORPS OF ENGINEERS ST PAUL
MN ST PAUL DISTRICT MAR 78

2/2

UNCLASSIFIED

F/G 13/2

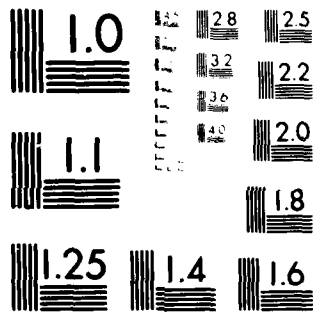
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A



EVEN DURING THE COLD WINTER MONTHS,
SOME AREAS OF THE SITE CONTINUE TO
PRODUCE RUNNING WATER.

Exhibit 6

8



THE WETLAND AREAS CONTAIN NUMEROUS
TYPES OF VEGETATION AND HABITAT.

Exhibit 6

A-17



THROUGHOUT THE SITE, BEAVER ACTIVITY
SUCH AS FELLED TREES AND BEAVER LODGES
CAN BE FOUND.

Exhibit 6



A TEST RAISE WAS CONDUCTED TO DETERMINE
IF THE LAKE COULD MAINTAIN A 2.5 FOOT
RAISE IN WATER LEVEL.

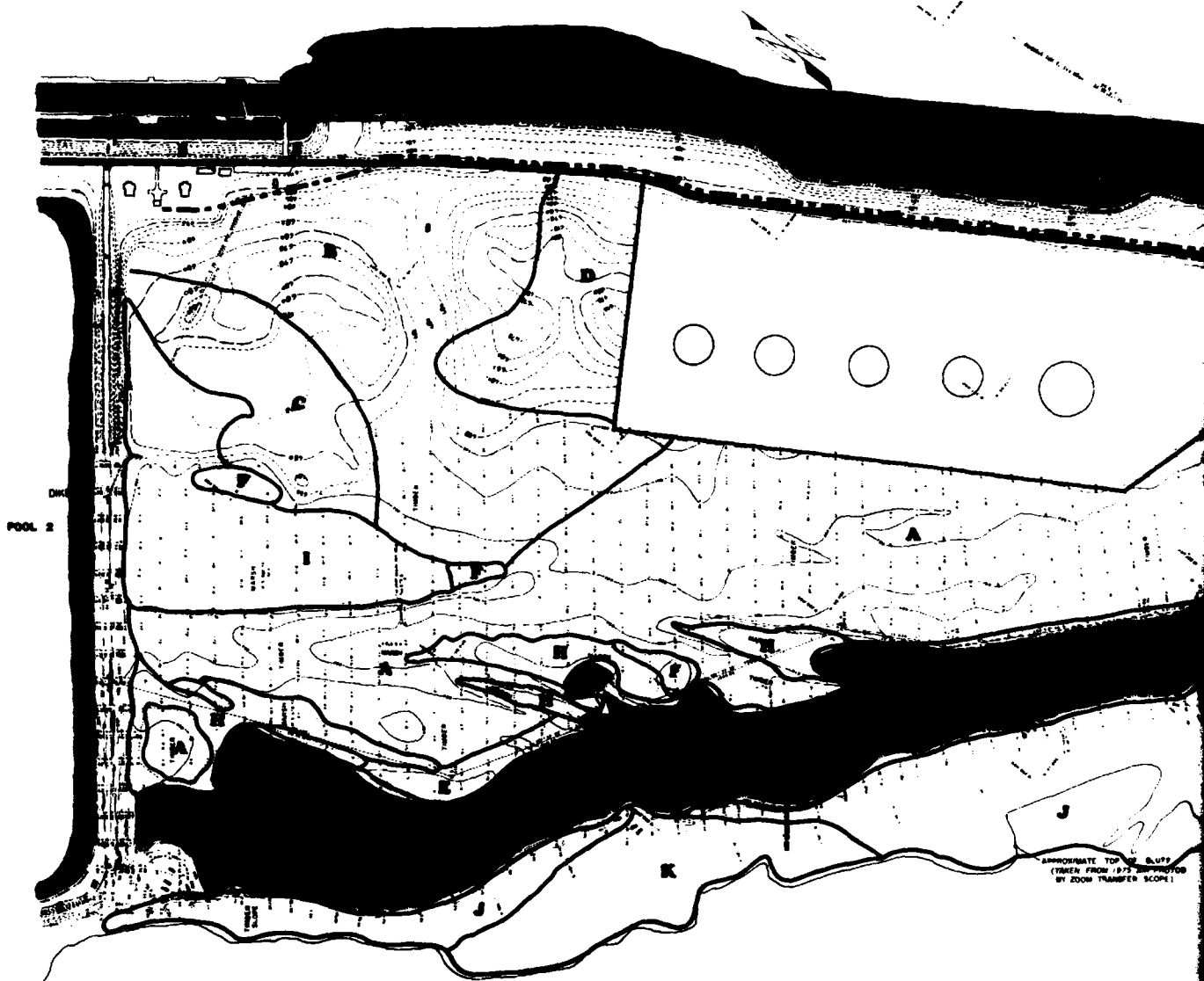
Exhibit 6



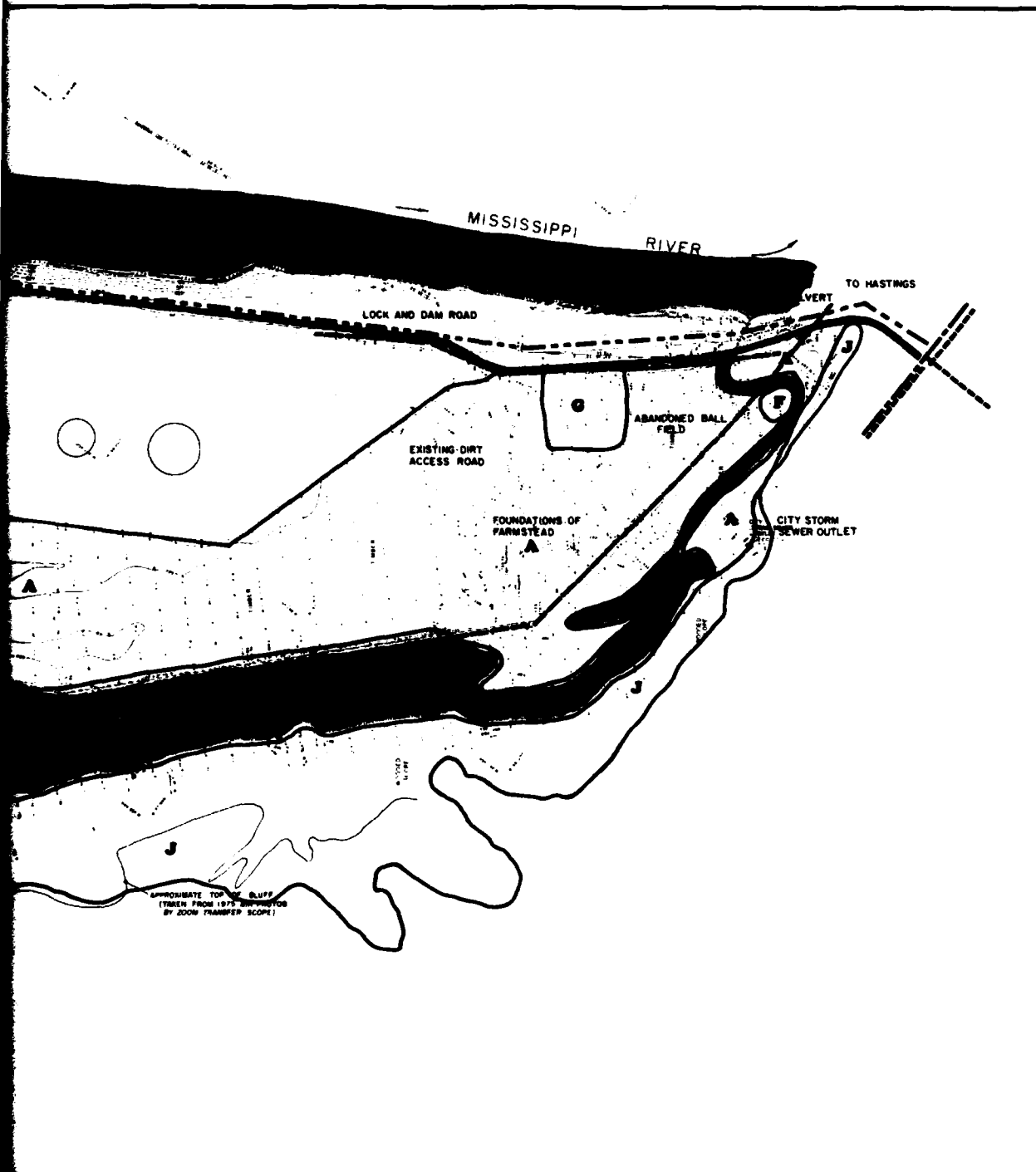
IN FEBRUARY OF 1977, A FISHING CONTEST
WAS HELD AS PART OF LAKE REBECCA DAY.

Exhibit 6

A-20



EXISTING CONDITIONS
LAKE REBECCA
HASTINGS, MINNESOTA



LEGEND

SCALE IN FEET



DEPARTMENT OF THE ARMY
ST PAUL DISTRICT, CORPS OF ENGINEERS
ST PAUL, MINNESOTA

- A** TYPICAL FLOODPLAIN FOREST
- B** DRY FLOODPLAIN FOREST
- C** BLACK WILLOW THicket
- D** SOIL OPEN
- E** LAKE COTTAGEWOOD

- F** WILLOW SHrub THicket
- G** DISTURBED AREA
- H** LAKE SLUING
- I** MUDFLAT
- J** UPLAND HARDWOOD FOREST

- K** OPEN HARDWOODS AND RED CEDARS
- L** CITY WATER
- M** CITY SANITARY SEWER
- N** ELECTRICITY
- O** TELEPHONE

DESIGNED BY: *[Signature]*
CHECKED BY: *[Signature]*
DATE: MARCH 1976
SCALE: 1"=500'

PLATE

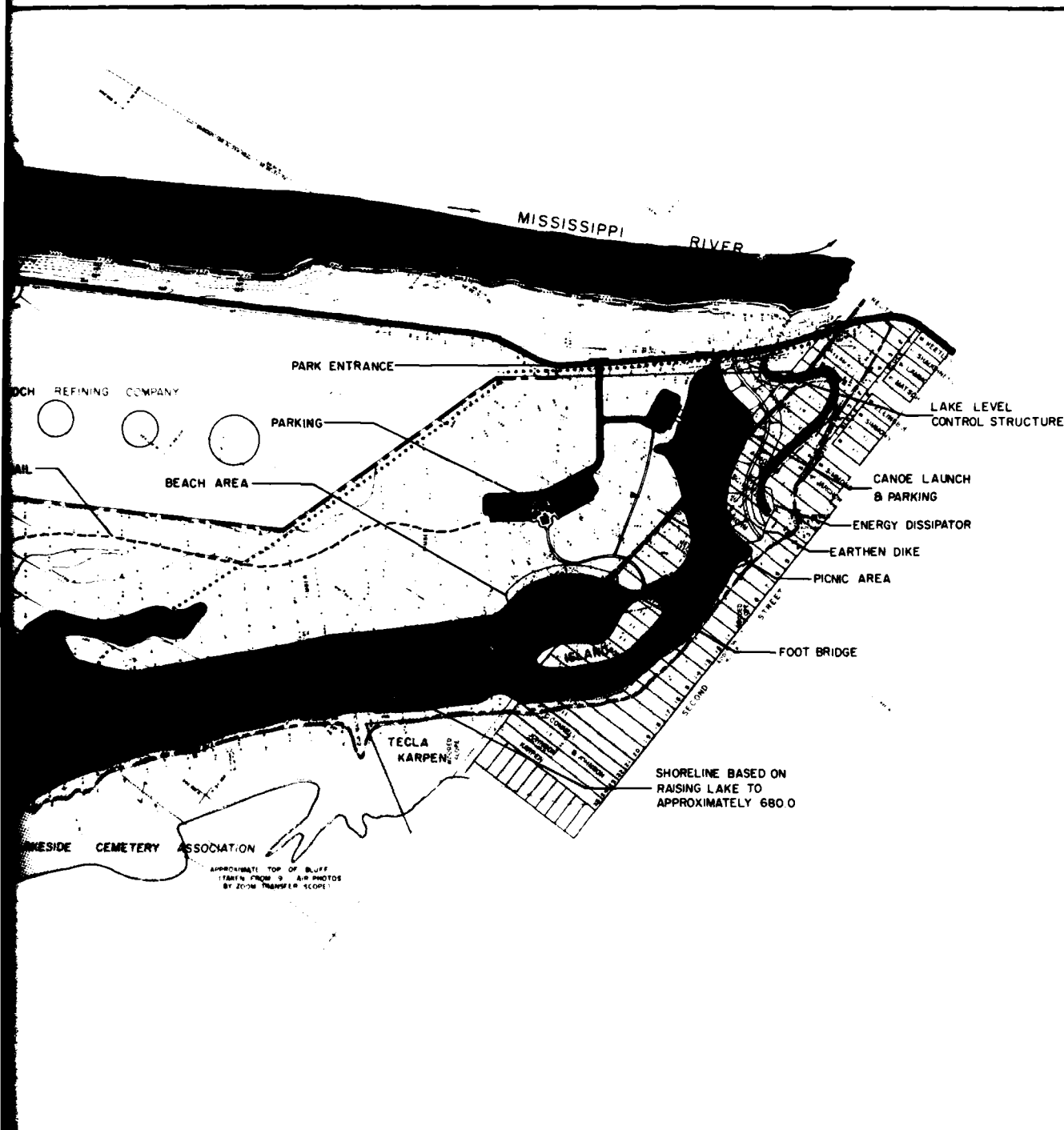
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1003



GENERAL PLAN LAKE REBECCA HASTINGS, MINNESOTA

78807



LEGEND

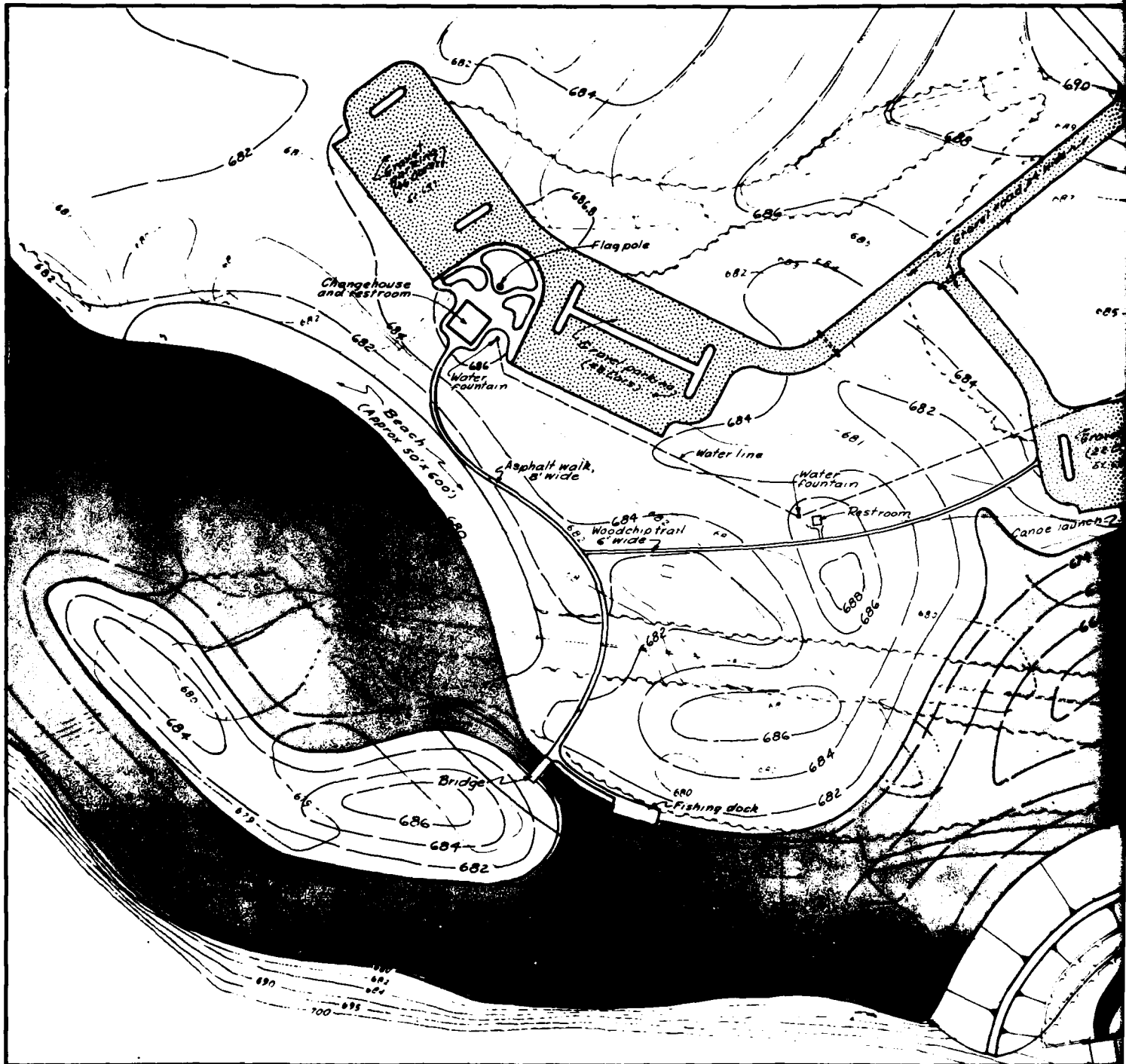
| | | | |
|--|----------------------|--|--------------------|
| | FLOODAGE EASEMENT | | PROJECT BOUNDARY |
| | SCENIC ZONING | | EXISTING POWERLINE |
| | POWERLINE RELOCATION | | LANDS TO BE LEASED |



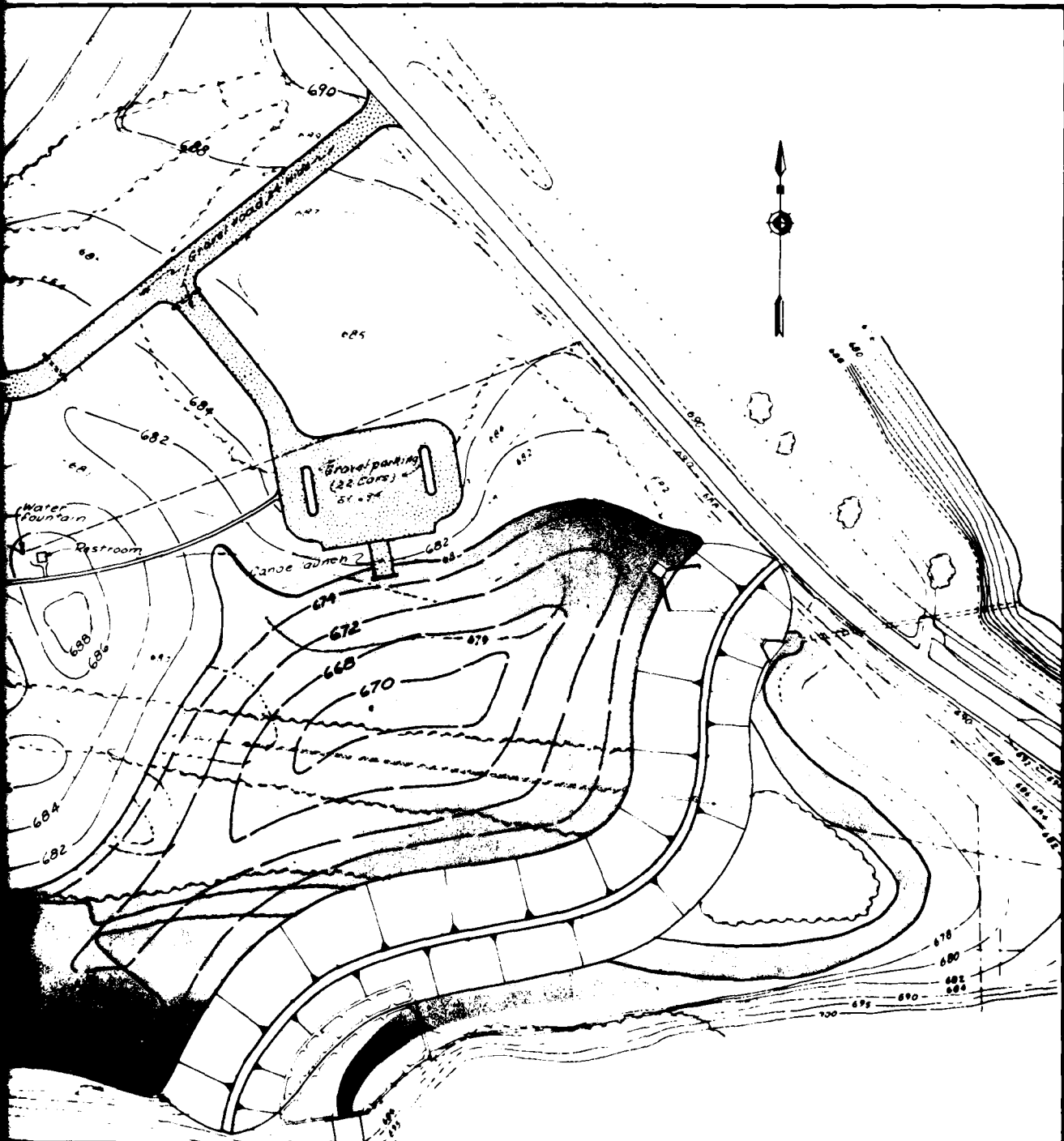
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT CORPS OF ENGINEERS
ST. PAUL, MINN. 55106

PLANNED BY: SS
DESIGNED BY: DAE
CHECKED BY: [Signature]
DRAWN BY: [Signature]
DATE: MARCH 1978
SCALE: 1" = 200'

2



RECREATION PLAN
LAKE REBECCA
HASTINGS, MINNESOTA



LEGEND



DEPARTMENT OF THE ARMY
11 1000 010000 - COPY OF 1000000
11 1000 010000

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
DATE
SCALE

3

1 2

FILMED

2-8